United States
Department of
Agriculture

Forest
Service

Environmental Assessment

Trinity Alps Wilderness Prescribed Fire Project

Big Bar Ranger District – Trinity River Management Unit – Trinity Alps Wilderness, Shasta-Trinity National Forest
Trinity, Siskiyou and Humboldt Counties, California

T70N R70E & R80E; T80N R60E, R70E, R80E; T90N R60E, R70E, R80E Humboldt Meridian and T370N R120W, T380N R120W Mt. Diablo Meridian

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CHAPTER 1 – PURPOSE OF AND NEED FOR ACTION

Introduction

The Trinity Alps Wilderness (Alps) is a vast landscape known for its remote areas of steep, rugged terrain. The Alps, which encompass 511,951 acres of federal lands and 4,285 acres of private lands, are part of the Klamath Mountain Bioregion in northwestern California. The USDA Forest Service is responsible for the administration and land management of the federal lands in the area. Three National Forests (Six Rivers, Klamath and Shasta-Trinity) administer programs within the Alps.

This analysis will address the environmental effects of the Trinity Alps Wilderness Prescribed Fire Project. The Forest Service proposes to implement prescribed fire on approximately 16,709 acres within the Shasta-Trinity National Forest managed part of the wilderness. The proposed action was designed to trend the treated areas toward the desired conditions, with consideration for the protection of communities and sensitive resources from severe and intense wildfires while recognizing that fires have played a key role in developing and maintaining diverse and resilient ecosystems.

The Trinity Alps Wilderness Prescribed Fire Project is located in the Shasta-Trinity National Forest, Big Bar Ranger District, Trinity River Management Unit in Trinity, Siskiyou, and Humboldt Counties, California (see Figure 1.1 below). The project area comprises the Upper New River, Eagle Creek, and Sixmile Creek 6th field watersheds and is approximately 11 percent of the Trinity Alps Wilderness - about 58,349 acres. The project area is located entirely within the western portions of the Trinity Alps Wilderness and consists primarily of federal lands with minor amounts of private inholdings. The legal description of the project area is as follows:[1]

- Humboldt Meridian

  T70N R70E Sections 1 through 24
  T70N R80E Sections 6 and 7
  T80N R60E Sections 1, 11, 12, 13, 14, 23 and 24
  T80N R70E Sections 1 through 36
  T80N R80E Sections 4, through 9, 16 through 21, and 28 through 32
  T90N R60E Sections 24 and 25
  T90N R70E Sections 17 through 36
  T90N R80E Sections 29, 30, 31, and 32;
- Mount Diablo Meridian

  T370N R120W Sections 6, 7, 8, 17, 18, 19, 20, 29 and 30
  T380N R120W Section 31.

Elevations in the project area range from about 1500 feet to 6700 feet above mean sea level.

[1] T = Township, R = Range, N = North, S = South, E = East, and W = West.

Historically, mixed-severity fires in the area played a significant role in creating a high spatial complexity of vegetation, including openings of different sizes, forested stands that were generally more open and late-successional, closed-canopy forests. Fire suppression has resulted in uncharacteristically dense vegetation and high fuel loading, a decline in wildlife forage and habitat diversity, and an elevated risk of high-severity, stand-replacing fires.

Past fire suppression has also altered the undeveloped character and natural conditions in some portions of the project area (e.g. felled trees with cut stumps visible along some of the ridgetops). The Forest Service desires to move these areas toward a more natural character and to allow for less intrusive future fire suppression efforts.

Current fuels conditions have caused concerns over fire effects to resources (e.g. wildlife habitat, soils, human uses/recreation, hydrology, air quality, etc.), public and firefighter safety and fire escaping the wilderness into nearby communities at risk[2]. There is a need to take action to preserve wilderness character and to meet recreational, scenic, educational and historic uses and conservation values.

In compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations, the Shasta-Trinity National Forest has prepared this environmental assessment (EA) to inform the public and decision makers of the environmental concerns of the project, and disclose the potential effects of fuels treatment in the Trinity Alps Wilderness. It also provides the supporting information for a determination to prepare either an environmental impact statement or a finding of no significant impact (FONSI).

[2] Federal Register, Vol. 66, No. 160. Friday, August 17, 2001. Page 43384.

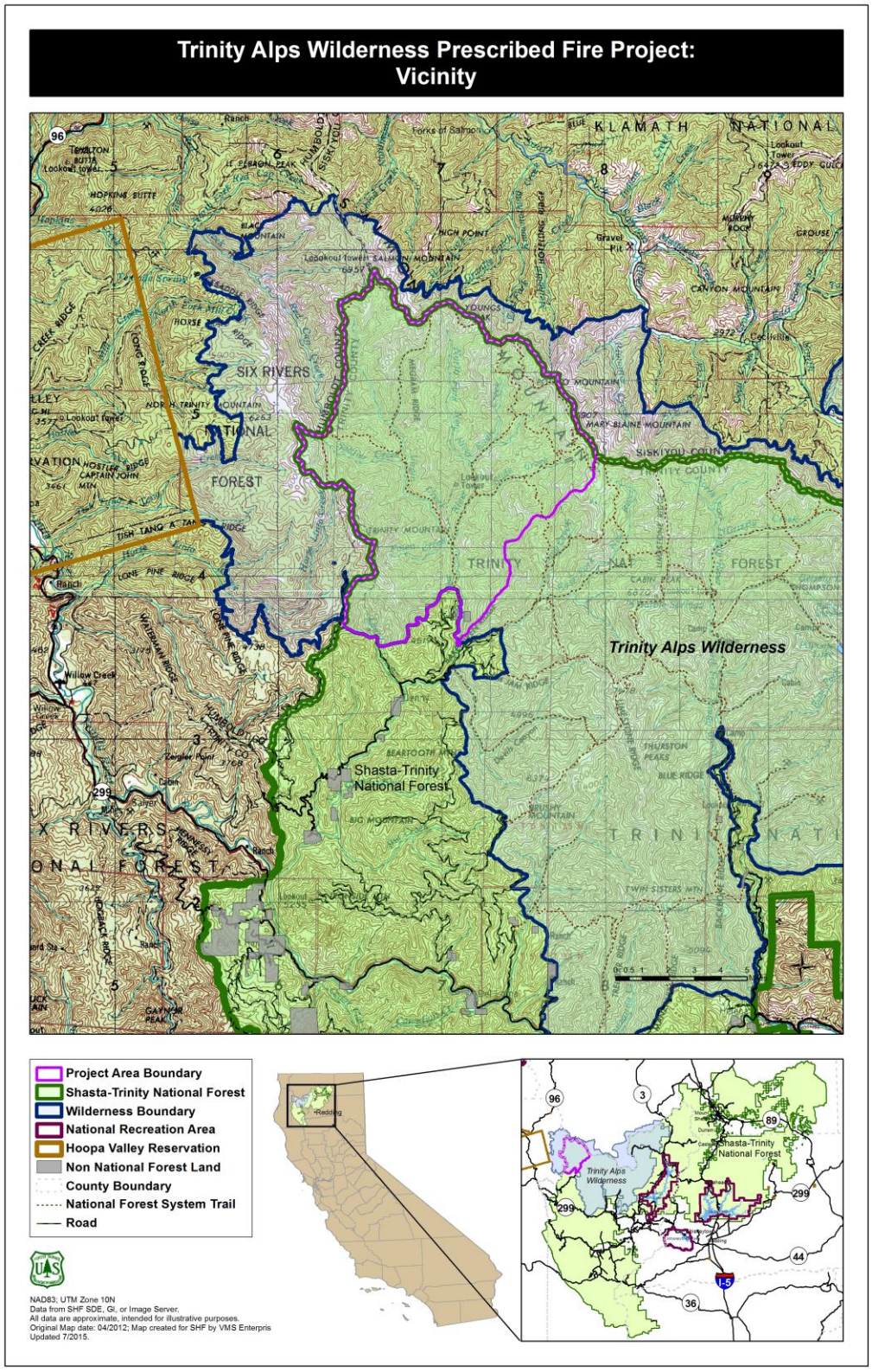


Figure 1.1. Trinity Alps Wilderness Prescribed Fire Project vicinity.

Document Structure

The document is organized into four chapters and appendices as follows:

- *Chapter 1 - Purpose and Need:* This chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for meeting the purpose and need. It also describes the laws and policy that guided the preparation of this EA; the past, current and reasonably foreseeable activities and events considered in cumulative effects analysis; and the decisions to be made by the responsible official.
- *Chapter 2 – Issues and Alternatives, including the Proposed Action:* This chapter details how the Forest Service informed the public of the proposal and how the public responded. It then provides a more detailed description and map of the agency's proposed action as well as any alternatives for meeting the purpose and need. This discussion also includes proposed design features and mitigation measures. Finally, Chapter 2 provides a summary table of whether and to what extent each alternative analyzed in detail responds to the purpose and need described in Chapter 1.
- *Chapter 3 - Environmental Consequences:* This chapter describes the environmental effects of implementing the proposed action and other alternatives. It presents the scientific and analytical basis for the comparison of alternatives presented at the end of Chapter 2. Alternatives are discussed in relation to their achievement of the purpose and need. Finally, this chapter discusses the consequences of the project relative to significance elements.
- *Chapter 4 - Agencies and Persons Consulted:* This chapter provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

All documentation related to this project may be found in the project record located at the Trinity River Management Unit office in Weaverville, California.

Conditions that Determined the Need for the Project

Existing Condition

In summary, the existing condition is as follows:

- Large portions of fire-adapted ecosystems within the Alps are in a state of substantial departure from their historical (pre-suppression, pre-1905) fire regime. Historically, approximately 90 percent of the analysis area supported vegetation at or below a fire return interval of 20 years. Approximately 91 percent of the project area has missed at least three fire intervals, with some areas having missed as many as six intervals.
- The lengthened fire return interval has resulted in large portions of the wilderness experiencing uncharacteristic fire behavior due to high fuel concentrations.
- Currently the fuel loading within the project area is estimated to be as high as 75 tons per acre and, when combined with standing dead material that is likely to fall in

coming years (from past wildfire events), an additional 50 tons per acre may accumulate is some areas.

- The existing fuel condition poses a substantial risk of wildfires escaping from wilderness onto adjacent lands including wildland urban interface areas, increased suppression costs and an increase in public health concerns over hazardous air quality.

Desired Future Condition

Desired future conditions for the land allocation in which treatments would occur – MA 4 (Wilderness Management Areas) - are described in the Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1995a)[3] and in Forest Service Manual (FSM) 2300, Chapter 2320 – Wilderness Management. In summary, these desired future conditions are as follows:

- The risks and consequences of wildfire occurring within wilderness or escaping from wilderness are at an acceptable level (FSM 2324.21).
- The fuels condition allows for reduced fire behavior characteristics and enables wildfire suppression tactics to make use of natural barriers, topography or watercourses and minimum impact suppression techniques.
- Lightning-caused fires play, as nearly as possible, their natural ecological role within wilderness (FSM 2324.21) (Forest Plan page 4-93), with an appropriate suppression response ranging from confinement to control (Forest Plan page 4-17) to protect public safety.
- The risks and consequences of public health and safety concerns caused by hazardous air conditions are reduced.

Other Forest Plan goals include the following:

- Restore fire to its natural role in the ecosystem when establishing the Desired Future Condition of the landscape (Forest Plan, p. 4-4).

Risks and Consequences of Wildfire

Over the last century, mean annual temperature in the Trinity Alps area has risen by about 2 to 3 degrees Fahrenheit. The result is that the potential for high fire behavior occurs on more days during the year (based on the energy release component index and decrease in predicted relative humidities) (Brown et al. 2003). Fire suppression has led to fuel-rich conditions, and most future climate modeling predicts climate conditions that will likely exacerbate these conditions, thus increasing the likelihood of large fire occurrence.

As noted above, successful fire suppression over the last century has resulted in increased fuels and vegetation density. Consequently, fires have become more intense and difficult to control, especially in the western half of the Alps. The effects of these fires are well-documented. Several recent wildfires – in 1987, 1999, 2006 and 2008 - burned in excess

[3] All page references in this document refer to the version of the Forest Plan available at the following URL: http://www.fs.usda.gov/detailfull/stnf/landmanagement/planning/?cid=stelprdb5108815&width=full

of 100,000 acres and in some instances prompted mandatory and voluntary evacuation advisories because of the threat of wildfire to homes and property. Suppression costs in two of these fires exceeded $80 million and, in one of the fires, ten wildland firefighters lost their lives.

Concerns over fire effects to resources in the Alps (e.g. wildlife habitat, soils, human uses/recreation, hydrology, air quality, etc.) and concerns for public and firefighter safety will likely escalate if the current fuels conditions persist.

Fuels Conditions

Past fire suppression and the Big Bar Wildfire Complex of 1999 created vegetation and fuels conditions within the project area that are conducive to large fire growth and large areas of high-severity fire, the most recent examples of which include the Backbone and Red Spot fires of 2009. Dense brush, snags and large dead and downed woody debris left over from the Big Bar Complex created conditions that made these 2009 fires difficult to control and threatened firefighter safety.

Numerous snags were felled during construction of indirect fire suppression lines during the 2009 fire season that the fires never reached, and in which no other fuels mitigations were implemented; these lines now have heavy accumulations of large dead and downed woody debris (see Figure 1.2 below). Many of these indirect hand lines occur on ridgelines that were historically used to stop fires. The current fuels conditions are not conducive to use of the ridgelines during fire suppression efforts in future wildfires. With limited usability of existing fire lines, fires are more likely to escape the wilderness into nearby communities at risk.

Figure 1.2. Salmon Summit ridge, with numerous felled trees and stumps along the fire line.

Natural Ecological Role of Fire in Wilderness

A natural fire regime is a general classification of how fire played a role in an ecosystem, in the absence of modern human intervention but including the influence of aboriginal burning (Agee 1993). Historically, approximately 90 percent of the analysis area supported vegetation at or below a fire return interval (FRI) of 20 years (Fire Regime I) based on Fire Return Interval Departure GIS data provided by the Region 5 Ecology Program. With frequent fire of low to mixed severity, fuel accumulations over most of the area were historically maintained at lower levels than currently exist, and natural topographic features such as ridgelines and streams were often sufficient to impede fire spread (Taylor and Skinner 2003)

Currently the fuel loading within the project area is estimated to be as high as 75 tons per acre and, when combined with standing dead material that is likely to fall in coming years (from past wildfire events), an additional 50 tons per acre may accumulate is some areas. The current fuels conditions are not conducive to use of natural topographic features during fire suppression efforts in future wildfires (see Forest Plan Direction – Standard and guideline 4.D3 - below). These conditions are of concern with regard to fire escaping the wilderness into nearby communities at risk.

Forest plan direction currently requires that, "Wildland fires will receive an appropriate suppression response that may range from confinement to control. Unless a different suppression response is authorized in this Plan, or subsequent approved Plans, all suppression responses will have an objective of control" (LRMP, page 4-17). That direction notwithstanding, the current fuel conditions would preclude allowing fires in the Alps to burn unchecked, due to the previously-noted risks of uncharacteristic high-severity fire and of fire escaping the wilderness to nearby communities. Reducing fuel levels would create a condition where lightning-caused fires could resume a more natural role in the wilderness.

Public Health and Safety Concerns

In addition to the mandatory and voluntary evacuation notices for wildfire risk noted above, during the wildfires of 1987, 1999, 2006 and 2008 the Alps experienced persistent temperature inversions during times of atmospheric stability that trapped smoke over large areas, prompting evacuation advisories due to poor air quality. In each instance, air quality standards exceeded the California Air Resources Board thresholds and many communities suffered long durations of hazardous air. Without management to reduce current fuel loads, this situation is likely to persist as fires become more difficult to control.

Purpose of and Need for Action

Based on comparison of the existing and desired condition as described above, the purpose and need of the proposed action is to:

1. Reduce the risks and consequences of wildfire occurring within the wilderness or escaping from the wilderness (i.e. reduce fuel accumulations in the project area).

2. Create a fuels condition that enables the use of minimum impact suppression tactics that make use of natural barriers, topography or watercourses.
3. Permit future lightning-caused fires to play, as nearly as possible, their natural ecological role within wilderness (i.e. move the project area toward historic fire regime conditions).
4. Reduce the risks and consequences of public health and safety concerns created by hazardous air conditions during future wildfire events.

Proposed Action

The proposed action was developed based on the purpose and need using modeling, research, site-specific fire history and severity data, local knowledge, and data collected for the project area.

Maintenance of Existing Fire Lines

Existing fire lines include hand constructed fire lines used during suppression efforts of past fires, as well as trails that are currently part of the wilderness trail system. Maintenance of existing fire lines would consist of moving, by hand, heavy accumulations of large dead and downed fuels away from the fire line, clearing vegetation from the fire line, and scraping fire line down to bare mineral soil. No new fire line construction is proposed.

Prescribed Fire

Approximately 16,709 acres are proposed for prescribed fire treatment in the Trinity Alps Wilderness Prescribed Fire Project area. Implementation of the proposed action would likely occur over a period of approximately ten years. The timing of implementation would be determined based on current and predicted weather conditions, fuels conditions and compliance with State and federal air quality standards, with the intent to create primarily low- to moderate-intensity surface fires that would trend the project area toward the desired condition. Implementation under these circumstances would safely reduce fuel accumulations while minimizing adverse effects to other resources.

Proposed treatments consist of igniting prescribed fire along ridge tops under conditions conducive to a mosaic burn severity pattern, primarily of low- to moderate-intensity surface fire, as the fire backs down slope. Prescribed fire lighting techniques would consist of aerial ignition (plastic sphere dispenser and/or helitorch) and/or hand lightning methods. See Chapter 2 – Issues and Alternatives, for a detailed description of the proposed treatments.

The scoping letter (November 12, 2010) described a project-level amendment to the Forest Plan (USDA Forest Service 1995a) as part of the proposed action. Currently, the Forest Plan states “use of prescribed fire from planned ignitions to perpetuate natural ecosystems, or to protect adjacent resources, may be undertaken only after Washington Office approval.” (Forest Plan page 4-33). However, current Forest Service policy (FSM

2324.04b)[4] allows for approval of prescribed fire at lower levels within the organization (see e.g. FSM 2324.04b). Therefore, the Forest had planned on including a minor Forest Plan amendment to reconcile wording in the Forest Plan regarding the need for Washington Office approval for prescribed burning for this project. Since the scoping period ended however, the Forest has decided not to pursue an amendment to the Forest Plan, and will instead follow the Forest Plan direction And Forest Service Manual policy.

Scope of the Analysis

The Trinity Alps Wilderness Prescribed Fire Project EA is a project-level analysis. The scope of the analysis is confined to addressing the potential environmental consequences and issues related to project implementation. It does not attempt to address decisions made at higher levels, but rather to implement direction provided at those higher levels. The Trinity Alps Wilderness Prescribed Fire Project EA tiers to the Forest Plan EIS (USDA Forest Service 1995b) as directed by 40 CFR 1502.20.

In accordance with NEPA, the agency has the responsibility to assess direct and indirect environmental effects resulting from an agency action as well as the cumulative effects of all past, current and reasonably foreseeable actions. This EA analyzes those actions that fall within the cumulative effects analysis area described for each pertinent resource and that have the potential to affect the resource.

Laws, Policy, Direction and Other Guidance

National Forest management is guided by various laws, regulations, and policies that provide the framework for all levels of planning. Guidance is provided in Land and Resource Management Plans (Forest Plans) and site-specific planning documents such as this environmental assessment. Higher-level documents are incorporated by reference and can be obtained from Forest Service offices.

Laws

Federal laws and executive orders pertinent to project-specific planning and environmental analysis on NFS lands in the Trinity Alps Wilderness Prescribed Fire Project area include the following:

Federal Laws

- The Wilderness Act of 1964;
- The National Environmental Policy Act (NEPA) of 1969, as amended;
- The Clean Water Act of 1977, as amended;
- The Clean Air Act of 1963, as amended;
- The National Forests Management Act (NFMA) of 1976, as amended;

[4] FSM2324.04b2 states that "The Regional Forester is responsible for approving the use of prescribed fire on a wilderness by wilderness basis through approval of the appropriate management plan. The management plan sets forth the standards and guidelines for the use and application of prescribed fire and the methods of monitoring results.

- The Forest and Rangeland Renewable Resource Act (RPA) of 1974, as amended;
- The Archaeological Resources Protection Act of 1979;
- The National Historic Preservation Act of 1966;
- The Multiple Use Sustained-Yield Act of 1960;
- The Endangered Species Act (ESA) of 1973;
- The American Indian Religious Freedom Act of 1980.

Executive Orders

- Executive Order 11593 (protection and enhancement of the cultural environment);
- Executive Order 11988 (floodplains);
- Executive Order 11990 (wetlands);
- Executive Order 12898 (environmental justice);
- Executive Order 12962 (aquatic systems and recreational fisheries);
- Executive Order 13186 (Migratory Bird Treaty Act).
- Executive Order 13112 (Invasive species).

National Fire Plan

The National Fire Plan was developed in August of 2000, following a landmark wildland fire season, with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. Since the development of that plan over a decade ago, the Departments of Agriculture and Interior have been working together and with communities across the nation to manage wildland fire on Federal lands and in the wildland-urban interface.

In 2009, President Obama signed the Federal Land Assistance, Management and Enhancement (FLAME) Act, directing the Secretaries of Interior and Agriculture to submit to Congress a report that contains a cohesive wildfire management strategy. The Cohesive Strategy is a collaborative process with active involvement of all levels of government and non-governmental organizations, as well as the public, to seek national, all-lands solutions to wildland fire management issues. The Cohesive Strategy addresses the nation's wildfire problems by focusing on three key areas: restore and maintain landscapes, fire-adapted communities, and response to fire.

For more information please visit the National Fire Plan website at: http://www.forestsandrangelands.gov/resources/overview/.

Minimum Impact Suppression Tactics (MIST)

In the Alps, the Forest promotes minimum impact fire suppression methods that make use of natural barriers, topography or watercourses. In addition to direction in FSM 2324.23, the National Wildfire Coordinating Group has implemented a strategy of Minimum Impact Suppression Tactics (MIST), with guidelines for managing fires with the least impact to values at risk (National Wildfire Coordinating Group [NWCG] 2003). The concept of Minimum Impact Suppression Tactics is to use the minimum amount of forces

necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives.

For more information please visit the National Wildfire Coordinating Group website at: http://www.nwcg.gov/.

Hazard Tree Policy

The Forest Plan includes the following direction regarding hazard trees:

Standard and Guideline 20b(2) - Trees will be cut to protect the safety of forest users, such as hazard-tree removal in campgrounds and picnic sites, administrative sites, and along roads open to the public (Forest Plan page 4-26).

While these guidelines emphasize the management of "hazard" or "danger" trees along roads and in developed areas, they also apply to other forest management activities and follow Occupational Safety and Health Administration (OSHA) regulations (US Department of Labor 1994):

> *Danger Tree. A standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree.*
>
> *1910.266(h)(1)(vi): Each danger tree shall be felled, removed or avoided. Each danger tree, including lodged trees and snags, shall be felled or removed using mechanical or other techniques that minimize employee exposure before work is commenced in the area of the danger tree. If the danger tree is not felled or removed, it shall be marked and no work shall be conducted within two tree lengths of the danger tree unless the employer demonstrates that a shorter distance will not create a hazard for an employee.*

Felling of danger trees within the wilderness during project implementation is expected to be an uncommon occurrence; the management of identified danger trees within the wilderness would follow Minimum Impact Suppression Tactics (MIST) guidelines (see Appendix E) to minimize any visual effects.

Aquatic Conservation Strategy

The Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan (USDA Forest Service and USDI Bureau of Land Management 1994) was developed to "maintain and restore the ecological health of watersheds and aquatic ecosystems contained within them on public lands" and to "prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds" (USDA Forest Service and USDI Bureau of Land Management 1994). The nine ACS objectives are as follows:

- Maintain and restore the distribution, diversity, and complexity of watershed- and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.
- Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to

areas critical for fulfilling life history requirements of aquatic- and riparian-dependent species.

- Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
- Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction and migration of individuals composing aquatic and riparian communities.
- Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.
- Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
- Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
- Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Forest Plan Direction

The Forest Plan (USDA Forest Service 1995a) provides guidance for managing Shasta-Trinity National Forest System (NFS) lands. All page references in this document refer to the version of the Forest Plan available at the following Shasta-Trinity NF webpage:

http://www.fs.usda.gov/detailfull/stnf/landmanagement/planning/?cid=stelprdb5108815&width=full.

Forest Goals

The overall management philosophy of the Shasta-Trinity National Forest is to realize integrated multiple resource land management in the context of Ecosystem Management. Forest goals related to the proposed action include the following:

Fire and Fuels

- 4.10 - Restore fire to its natural role in the ecosystem when establishing the Desired Future Condition of the landscape (Forest Plan page 4-4).
- 4.11 - Achieve a balance of fire suppression capability and fuels management investments that are cost effective and able to meet ecosystem objectives and protection responsibilities (Forest Plan page 4-4).

Wilderness

- 4.6 (4.41) Manage Wilderness to meet recreational, scenic, educational, conservation, and historic uses while preserving wilderness values (Forest Plan page 4-6).

Standards and Guidelines

The Forest Plan provides Forest-wide direction and Management Area (MA) direction. Forest-wide direction applies to all management areas. Forest-wide and MA direction is detailed in Chapter 4 of the Forest Plan.

The following Forest Plan direction, standards and guidelines apply to the Trinity Alps Wilderness Prescribed Fire Project:

Fire and Fuels

- Standard and Guideline 4.8a directs that wildland fires will receive an appropriate suppression response that may range from confinement to control. Unless a different suppression response is authorized in this Plan, or subsequent approved Plans, all suppression responses will have an objective of "control" (Forest Plan page 4-17).

Wilderness Management

- Standard and guideline 4.24c directs the Forest Service to complete a Fire Management Plan for each Wilderness in two years, return fire to its natural role when not in conflict with public safety and permit fire management activities that are compatible with wilderness objectives (Forest Plan page 4-29).
- Standard and guideline 4.24i directs the Forest Service to manage vegetation to retain the primeval character of the wilderness environment and to allow natural ecological processes to operate freely. Remove trees only under emergency conditions such as fire, or insect and disease control (Forest Plan page 4-29).
    - Standard and guideline 4.24m directs the Forest Service to maintain high air quality in class I wilderness areas (Forest Plan page 4-29).
    - Standard and guideline 4.D-3 (Management Prescription V) directs that wildfire suppression tactics will favor the use of natural barriers, topography or water courses, and low impact techniques. After fires are declared out, take appropriate action to rehabilitate and/or restore the site.
    - Standard and guideline 4.D-5 (Management Prescription V) directs that use of prescribed fire from planned ignitions to perpetuate natural ecosystems, or to protect adjacent resources, may be undertaken only after Washington Office approval (Forest Plan page 4-33).
    - Standard and guideline 4.D-6 (Management Prescription V) directs the Forest Service to permit helispots when approved by the Forest Supervisor. Use natural openings to the extent possible (Forest Plan page 4-34).[5]
    - Standard and guideline D-11 (Management Prescription V) directs that management activities should be compatible with Primitive Recreation

[5] Helicopters would not be anticipated to land within the wilderness except in an emergency or for safety considerations.

Opportunity Spectrum (ROS) guidelines unless otherwise specified in approved Wilderness Management Plans (Forest Plan page 4-34).

- Standard and guideline D-14 (Management Prescription V) directs that wilderness is to be managed to meet Visual Quality Objectives (VQOs) of preservation (Forest Plan page 4-34).[6]
- Standard and guideline D-15 (Management Prescription V) directs the Forest Service to maintain snags, dead/down material, and hardwoods at naturally occurring levels. Dead/down vegetation may be used in amounts that can be replaced annually through natural accumulation. Standing vegetation (green or dead) may not be used (Forest Plan page 4-34).
- Management Area Direction Trinity Alps Wilderness (Management Area IV) directs the Forest Service to develop a fire management plan which uses planned and unplanned ignition to restore and maintain natural conditions. When implementing this plan, maintaining air quality is an overriding consideration (Forest Plan page 4-95).

Watershed Analysis

Conditions in the project area were addressed in the New River Watershed Analysis (USDA Forest Service 2000a). Key findings and recommendations to which this proposed action responds include the following:

- **KEY FINDING # 6** - Communities that are surrounded by a fire-prone forest will always have a potential threat to life and property. Forest fuels management actions are needed to minimize the threat of catastrophic wildfire damage to adjacent communities.

  Fire will always be a potential threat to life and property in communities surrounded by forest. Threat of fires can be reduced by working in conjunction with the communities and developing areas of modified fuel conditions surrounding them. To be effective, these are likely to be areas characterized by reduced fuels and more open space than the surrounding forest. Frequent prescribed fire will probably be an important part of the suite of treatments used to maintain these low-hazard areas.

  Management Recommendation – Work in conjunction with communities to develop areas of modified fuel conditions surrounding them…

- **KEY FINDING # 7** - Management actions are possible to reduce adverse impacts to air quality related to wildfires. In order to meet air quality standards and eliminate adverse air quality effects to the extent possible, management actions are needed to control the amounts of forest fuels and to influence the timing of when fuels are consumed by fire.

[6] The assignment and management of VQOs was guided by the 1974 Visual Management System Handbook (Agriculture Handbook 462). That handbook was superseded by Landscape Aesthetics – a Handbook for Scenery Management (Agriculture Handbook 701) (USDA Forest Service 1995c), which on page 2-4 equates the VQO of preservation to a Scenic Integrity Level of "Very High."

> Adverse impacts to air quality occur whenever natural fuels burn. Management actions may be implemented to keep the level below that harmful to human health. Accomplishing multiple short duration burns will reduce the available fuels before a large, long duration wildfire materializes. It is often more efficient to accomplish short-duration prescribed burns for maintenance purposes after some form of mechanical utilization or removal of some of the fuels.[7]
>
> Management Recommendation – Manage fuel treatment to reduce adverse impact to air quality…

- **KEY FINDING # 12** – Some Riparian Reserves may not be contributing to [Aquatic Conservation Strategy] ACS objectives. Riparian Reserves adjacent to larger perennial streams generally showed minor effects while reserves of dry intermittent channels often burned similar to the surrounding upland habitat. Management activities may be needed and/or modified to assure long-term protection of Riparian Reserves.

  > Any management strategy applied to burned areas poses some future risk to riparian and aquatic resources. If no fuel reduction projects are implemented, future fire intensity and erosional consequences could be extreme. The elevated fuel conditions will be a long-term liability, whereas treatment to reduce those fuels would only be a short-term impact.
  >
  > Management Recommendation – Design projects within and adjacent to riparian areas to meet and enhance ACS objectives…

Decision Framework

The responsible official for this project is the Forest Supervisor of the Shasta-Trinity National Forest. This EA is not a decision document; it discloses the environmental consequences of choosing the no-action alternative or an action alternative. This EA also aids the responsible official in determining whether the effects disclosed would have a significant effect on the environment. If the responsible official determines there would be no significant effects, he or she will select one of the alternatives and issue a "Finding of No Significant Impact" (FONSI) and a Decision Notice (DN). The final decision will be based on the information in this document, the reports to which it tiers, consideration of public comments, how well the selected alternative meets the purpose and need for the project, and whether the selected alternative complies with agency policy, applicable state and federal laws, and Forest Plan direction.

The responsible official will decide whether the Forest Service should take action to meet the purpose and need as described above. If so, the following elements would also be decided:

- Where and to what extent should such activities occur in the project area?
- What design features and mitigation measures should be used to meet applicable laws and Forest Plan direction?
- How should such design features be applied?

[7] No mechanical utilization or removal of fuels is proposed under this project.

- What monitoring is needed to assure that the desired objectives are met?

CHAPTER 2 ISSUES AND ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Chapter 2 describes the process by which public comments on the proposed action were sought, and how the issues raised were identified as alternative-driving or analysis issues. The issues were then described and assigned issue indicators by which the effects of project activities would be measured.

This chapter then describes any alternatives to the proposed action that were developed to address issues that could not otherwise be addressed through design features. It includes a description and map of each alternative considered, as well as rationale for any alternatives dropped from detailed analysis.

Finally, this chapter provides a summary table that displays whether and to what extent each alternative analyzed meets the purpose and need stated in Chapter 1 (see table 2.3 below).

Public Involvement

Public involvement in the project was sought during development of the proposed action in multiple public meetings and through the scoping process. The project was listed in the Schedule of Proposed Actions as of April 1, 2010.

Public meetings were held in Weaverville, California on September 13, 2010 and November 30, 2010 and in Willow Creek, California on December 1, 2010. Forest Service fire and fuels specialists presented the proposed action at the Trinity County Fire Safe Council meeting on October 28, 2010. The Northern California Prescribed Fire Council workshop on December 3, 2010 included discussion of prescribed fire in the Wilderness. A meeting with North Coast Air Quality Management District and Trinity County Board of Supervisors occurred on January 13, 2011.

Consultation was initiated with the local Hoopa Valley Tribe on November 3, 2010, and with tribal and council members of the Yurok and Hoopa Valley Tribes on July 15, 2011. Meetings with the Karuk Tribe were held on February 17, 2012 and on September 4 2012 to discuss the project.

A scoping letter was mailed on November 12, 2010 to individuals, government agencies, Native American groups and organizations that were expected to have interest in the project. In addition, a scoping notice was published in the Trinity Journal (local newspaper) and the Redding, CA Record Searchlight (the newspaper of record).

Ten comment letters were received – five during the scoping period and five after the scoping period ended. Comments were also provided by attendees at the above-noted public meetings. Using the comments from the public, other agencies, local tribes, and internal review by project specialists, the interdisciplinary team (IDT) developed a list of issues to address. See Appendix C for a detailed description of the issue identification process used to address comments received for this project and for the resulting issue disposition.

Issues

Issues were separated into three groups: alternative-driving issues, analysis issues and other issues. Alternative-driving issues were defined as those directly or indirectly related to implementation of the proposed action that could not be resolved through project design – such issues would require development and analysis of an alternative to the proposed action. Analysis issues were identified as those that were relevant to the proposed action but for which effects could be limited in scope or intensity through project design. The CEQ NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

An action alternative that would accomplish the proposed treatments by non-motorized methods only (i.e. no aerial ignition and no use of chainsaws under any circumstances) was considered but was eliminated from detailed study (see the discussion on alternatives below). No other alternative-driving issues were identified during public scoping, however internal review by project fuels specialists raised concerns over the lack of proposed treatments within the Virgin Creek drainage and the potential consequences for future fire management in the project area. The IDT developed an additional action alternative to address this concern.

Several analysis issues/resource concerns relevant to the proposed action were identified in comments received during scoping or through internal review by project specialists. These issues and resource concerns were addressed by project specialists in analysis. The issues addressed, and the issue indicators by which effects of the alternatives were measured, are as follows:

Air Quality

Issue: Project activities may cause adverse effects on air quality.

Issue Indicators:

- Predicted smoke emissions (PM_{10}, $PM_{2.5}$, and CO) from each alternative based on fuel loadings;
- Coordination with State and local air quality districts and subsequent compliance through smoke management plans and monitoring procedures.

Fire and Fuels

Issue: Project activities may not achieve the Project's desired effects.

Issue Indicators:

- Predicted flame lengths during a wildfire event after implementation;
- Predicted crown fire potential during a wildfire event after implementation.

Heritage Resources

Issue: Project activities may cause undesired or adverse effects to heritage resources.

Issue Indicators:

- Effectiveness of protection measures incorporated into project design features.

Wilderness Values

Issue: Project activities may cause undesired or adverse effects on wilderness values and character

Issue Indicators:

- Duration and intensity of noise disturbance;
- Achievement of assigned Visual Quality Objectives (VQOs);
- Compliance with the Wilderness Act of 1964.

Alternatives

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No fuels treatment would be implemented to address the Purpose and Need.

Alternative 2 – Proposed Action

In order to meet the purpose and need described in Chapter 1, the Trinity River Management Unit of the Shasta-Trinity NF proposes to implement prescribed burning on NFS lands encompassing approximately 16,709 acres within the Trinity Alps Wilderness (see Figure 2.1 below). Existing trails and fire line would be used during project implementation. No new fire line construction is proposed.

Maintenance of Existing Fire Lines

Maintenance of existing fire lines would consist of moving by hand, heavy accumulations of large dead and downed fuels away from the fire line, clearing vegetation from the fire line, and scraping fire line down to bare mineral soil. This may occur from Salmon Summit to Election Gap, from Salmon Summit to Fawn Ridge, from Fawn Ridge to New River, from the ridgeline separating Barron Creek and Quinby Creek drainages to the wilderness boundary and from the wilderness boundary to the New River – a distance of approximately 42 miles. This activity would be accomplished by ground crews using non-motorized methods (e.g., ground crews using primitive tools such as crosscut saws, pry bars and manual grip hoists) within the existing fire line. The use of chainsaws during fire line maintenance would be limited to situations in which it is determined that

use of crosscut saws would be unsafe (e.g., felling of danger trees that cannot be safely avoided or otherwise mitigated). Such instances are predicted to be rare.

Prescribed Fire

Proposed treatments consist of igniting prescribed fire along ridge tops to create a mosaic burn severity pattern, primarily of low- to moderate-severity surface fire as the fire backs down the slope. Prescribed fire would consist of aerial ignition (plastic sphere dispenser and/or helitorch) and/or hand lighting methods.

Implementation of prescribed fire will occur when climatic variables (such as wind speed and direction) and fuel variables (such as fuel moistures) are considered optimal to achieve the desired fire behavior. This will increase the likelihood of successfully meeting objectives and reduce the risk of escaped prescribed fire. The timing of ignition would be determined based on current and predicted weather conditions, fuels conditions and compliance with State and federal air quality standards, with the intent to create primarily low-to moderate-intensity surface fires that would trend the project area toward the desired condition.

Helicopters may be used both for ignition and logistical support (e.g. longlines for supplies). No new helispots would be constructed, and helicopters would not be anticipated to land on existing helispots within the wilderness except in an emergency or for safety considerations. Helicopter flight time within wilderness would average approximately 4 to 5 hours in a given day, would be intermittent rather than continuous, and would be based on weather and burning conditions. Approximately two days of intermittent helicopter presence (4-5 non-contiguous hours per day) within wilderness per year for up to ten years are expected.

Where and when feasible, prescribed fire would be ignited and managed using ground crews. The determination of where and when to use ground crews would be made at the time of implementation; consideration would be on a site- and conditions-specific basis. The ability to safely implement prescribed fire in rugged, remote terrain using non-motorized methods (i.e. ground crews) only is dependent on many variables (e.g., site-specific fuels conditions, weather conditions, and extent of the "burn window" – the period of time when other variables are conducive to safe and successful prescribed fire operations); unexpected changes in one or more of those variables could put ground crews at risk.

Due to the existence of these variables, it is not possible to determine if ignition and management of prescribed fire on any portion of the project area by ground crews only could be safely conducted. The remoteness and steep, rugged terrain over most of the project area, when combined with current fuel conditions, present unacceptable safety risks to ground crews. Based on these factors, we predict that such opportunities would be very limited and may not arise at all.

Prescribed fire would be ignited as follows:

1. Salmon Summit to Election Gap – Approximately 1,682 acres. Implement prescribed fire of low-to-mixed severity with fire predicted to back downhill approximately 1,000 feet from the main ridgetop.

This is a strategic major ridgeline for fire suppression. Much of the area has high density of large snags and fuel loading. This is primarily due to the 1999 Megram Fire. In addition, suppression line constructed along the ridge during the 2009 Backbone Fire, which that fire never reached, has large amounts of unconsumed downed fuels (see Figure 1.2 above). Reducing fuel loading is necessary for this ridgeline to serve as a functional suppression line in the future. It also has a major trail system that allows minimum impact suppression tactics both for the implementation of prescribed fire and for future wildfire suppression.

2. Election Gap to New River – Approximately 1,204 acres. Implement prescribed fire of low-to-mixed severity with fire predicted to back downhill approximately 1,000 feet from the main ridgetop.

This is a strategic ridgeline to hold fire in the future. This ridgeline burned most recently in the 2006 Bake-Oven Complex. Maintaining low fuel loadings is necessary to use this ridgeline in future fire suppression efforts.

3. Salmon Summit to Fawn Ridge – Approximately 2,039 acres. Implement prescribed fire of low-to-mixed severity with fire predicted to back downhill approximately 1,000 feet from the main ridgetop.

Portions of this ridgeline burned in the 2009 Backbone Fire. Much of the area has a high density of large snags and fuel loading where the Backbone Fire did not burn and suppression line was put in place. This is a major ridgeline and strategic place for holding future fires. It also has a major trail system that allows minimal impact suppression tactics for both the implementation of prescribed fire and future wildfire suppression.

4. Megram Ridge – Approximately 9,619 acres. Implement prescribed fire of low-to-mixed severity using ridge-top ignitions on Megram Ridge. Fire would be predicted to back downhill as far as the Virgin Creek / Slide Creek confluence to the south, Virgin Creek to the west, the Salmon Mountain ridgetop north to the Salmon Summit Scenic trail, and Slide Creek or North Fork Creek to the east.

This is a strategic ridgeline that separates two 6th field watersheds. The proposed treatment would increase the likelihood of fire holding on this major ridgetop. In addition, Virgin Creek, Slide Creek, and North Fork Creek have historically served as successful suppression lines. Reducing fire behavior potential along these creeks would maintain future holding lines and reduce cumulative watershed effects from future wildfires.

5. Barron Creek – Approximately 2,165 acres. Implement prescribed fire of low-to-mixed severity using ridge-top ignitions on Fawn Ridge and/or the ridgeline separating Barron Creek and Quinby Creek drainages. Fire would be predicted to back downhill to the Wilderness / project boundary to the south, New River to the east, Fawn Ridge to the north, and the ridgeline separating Barron and Quinby Creek drainages to the west.

Fawn Ridge and the ridgeline separating Barron Creek and Quinby Creek drainages have historically been used as fire suppression ridges. However, much of the area has high density of large snags and heavy fuel loading. This is primarily due to the 1999 Megram

Fire and suppression line construction during the 2009 Backbone Fire. Reducing fuel loading is necessary for this ridgeline to serve as a functional suppression line in the future. These ridgelines have served well in the past as functional suppression lines and, with some maintenance, would be more suited to serve as suppression line in the future. These ridges are the last major ridgelines south of the Alps Wilderness that could be held to keep fire in the wilderness and out of nearby communities at risk.

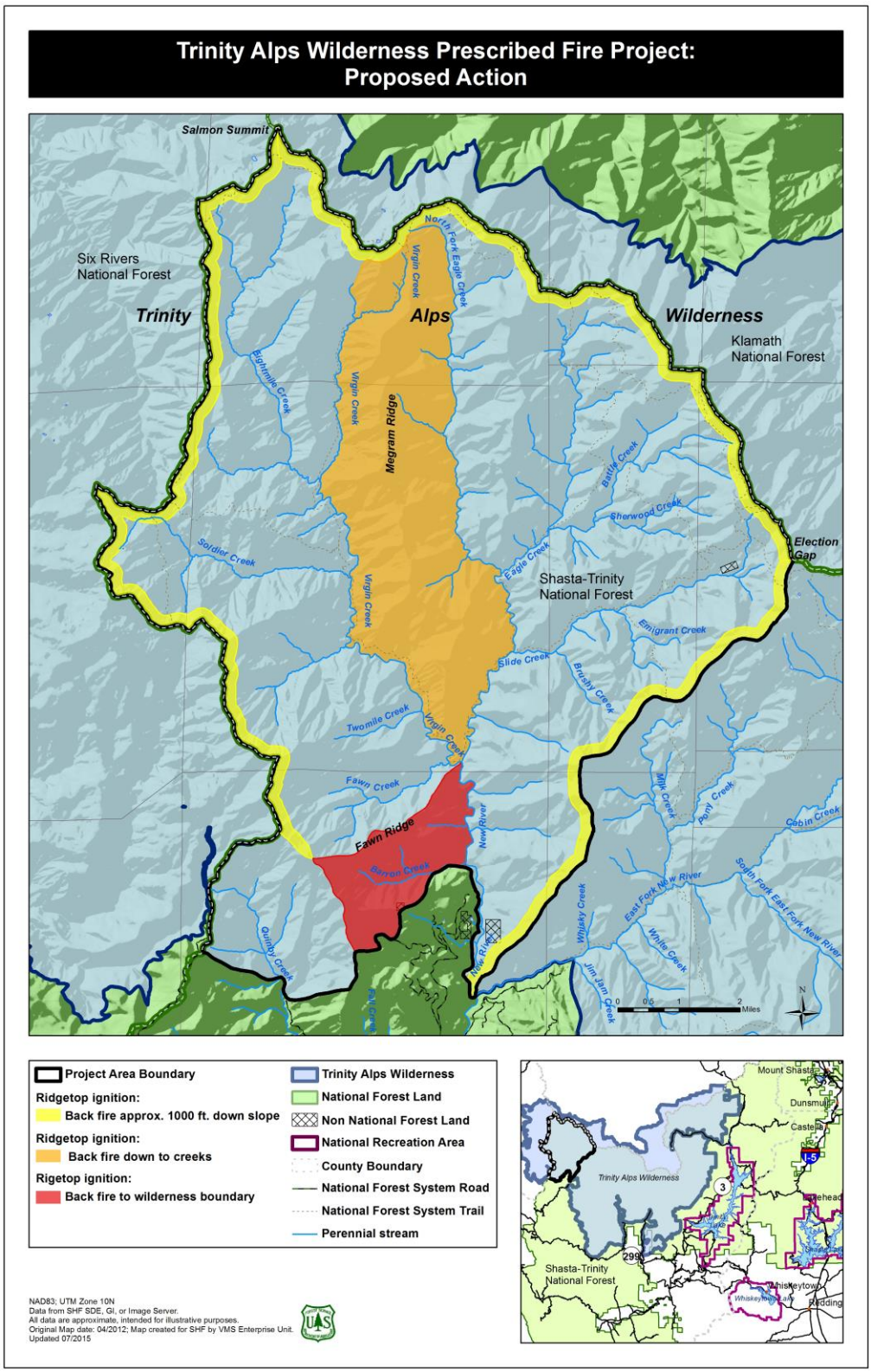


Figure 2.1. Trinity Alps Wilderness Prescribed Fire Project– Alternative 2 (proposed action).

Alternative 3 – Additional Treatment Areas

Alternative 3 was developed to respond to concerns of fire and fuels specialists over fuels conditions within the Virgin Creek drainage (see Figure 2.2 below). In addition to all of the treatments under the proposed action (see above), the following prescribed fire treatments would also be implemented under Alternative 3:

1. Forest boundary to Virgin Creek (Two Mile Ridge) – Approximately 1,090 acres. Implement prescribed fire of low-to-mixed severity using ridge-top ignitions. Fire would be predicted to back down to the north and south side of both of these sub-ridges approximately 1,000 feet. Fire would be allowed to back down to Virgin Creek to the east.
2. Forest boundary to Virgin Creek (Six Mile Ridge) – Approximately 524 acres. Implement prescribed fire of low-to-mixed severity using ridge-top ignitions. Fire would be predicted to back down north and south of this sub-ridge approximately 1,000 feet. Fire would be allowed to back down to Virgin Creek to the east.
3. Forest boundary to Virgin Creek (Soldier Ridge) – Approximately 765 acres. Implement prescribed fire of low-to-mixed severity using ridge-top ignitions. Fire would be predicted to back down north and south of this sub-ridge approximately 1,000 feet. Fire would be allowed to back down to Virgin Creek to the east.

Two Mile, Six Mile and Soldier ridges serve as three of only a few sub-ridges in the western side of the Virgin Creek drainage suitable for accessing and potentially holding fires due to their location, slope steepness and orientation to other key topographic components in the drainage. By treating these three areas, future fires within the larger Virgin Creek drainage would become more self-regulated in size through interaction with previous treatments and/or fires. The westernmost portion of these ridgelines burned in the 2009 Backbone Fire. Much of the area has a high density of large snags and downed fuels resulting from past wildfires. More recent fires, such as the Backbone fire, have helped to remove some of these snags. However, the high density of large snags remaining makes it difficult for firefighters to use the ridges for access during initial and extended attack.

Alternative 3 would add approximately 2,379 acres to the treatments proposed for Alternative 2; a total of approximately 19,088 acres of prescribed fire would occur under this alternative. No additional fire line maintenance beyond that proposed under Alternative 2 would occur under this alternative. Implementation of this alternative would not be expected to increase helicopter flight time beyond the predicted 4-5 non-contiguous hours per day for two days per year under Alternative 2. As with Alternative 2, implementation of this alternative would occur during a period of up to ten years.

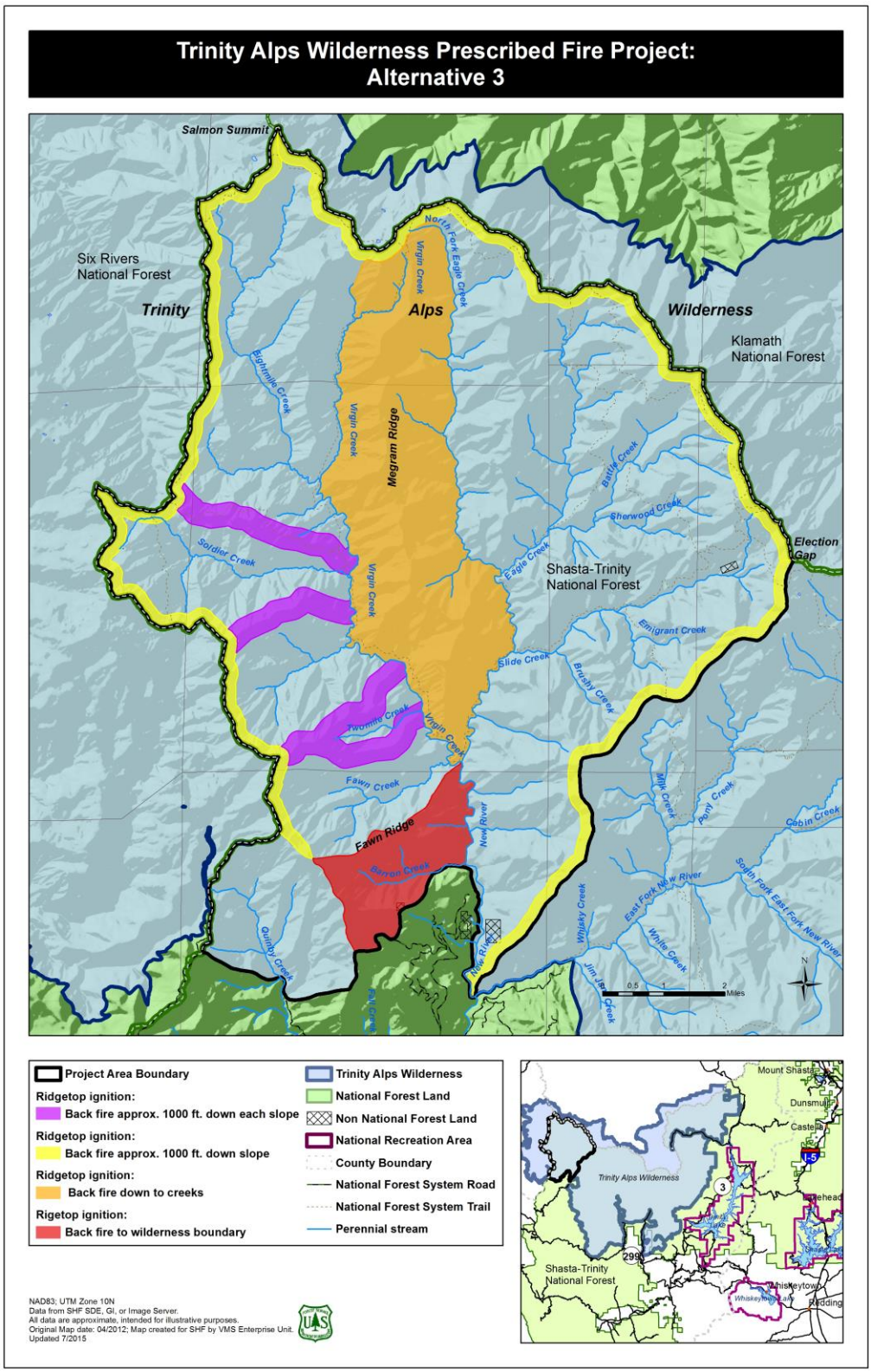


Figure 2.2. Trinity Alps Wilderness Prescribed Fire Project– Alternative 3.

Alternatives Not Considered in Detail

An action alternative that would accomplish the proposed treatments by non-motorized methods only (i.e. no aerial ignition and no use of chainsaws under any circumstances) was considered but was determined to be infeasible for the following reasons:

1. Hand-ignition only in the project area would expose ground crews to unacceptable risk due to the remote, rugged terrain.
2. While felling of danger trees would be an uncommon occurrence under either action alternative, restricting this activity to hand saws only may expose fallers to unnecessary risk due to steep, rugged terrain and/or characteristics that render a given danger tree highly unstable.

Appendix D – Minimum Requirements Decision Guide (MRDG) provides a detailed analysis of the feasibility and potential benefits and adverse effects to wilderness values of a non-motorized action alternative.

Features Common to Both Action Alternatives

In response to public comments and internal review by project specialists, specific design features and monitoring were incorporated into both action alternatives. These design features were proposed to reduce or eliminate potential negative impacts to resources in the project area; they would be implemented as part of either action alternative.

The Best Management Practices (BMPs) cited in the design features are defined in Appendix B of this EA.

Note: Some design features apply to more than one resource; to avoid repetition, these design features are only listed once.

Air Quality

Implementation of prescribed fire would comply with applicable Federal, State and North Coast Unified Air Quality Management District (NCUAQMD) air quality laws and regulations concerning overall project emissions with emphasis on prescribed burning coordination, emissions and smoke impacts mitigations.

1. A smoke management plan would be developed in accordance with AQMD direction and submitted to the AQMD prior to implementation of prescribed fire.
2. Prescribed burning during periods of high public use would be avoided or mitigated through smoke management procedures that would minimize impacts to areas of high public use.

Danger Trees

The felling of danger trees (live or dead) during project implementation is expected to be an uncommon occurrence. Any trees identified as danger trees would be avoided where possible. Those that cannot be avoided would be abated in a manner consistent with Minimum Impact Suppression Tactics (MIST).

1. Where safety considerations and qualified personnel make possible, danger trees could be blasted to avoid the unnatural appearance of stumps. See the project record for a description and illustration of this method, which is the preferred treatment for danger trees in wilderness areas.

2. Where blasting is not considered safe or qualified personnel are not available, danger trees would be cut with stumps as close to the ground as possible; stumps would then be covered with on-site vegetation or other materials. Trees would be felled using hand saws unless it is determined on a site-specific basis that use of chainsaws is necessary for safety reasons.

Fire / Fuels

A detailed prescribed fire implementation plan (burn plan) would be completed prior to implementation of prescribed fire. The burn plan would include all elements required by Forest Service Manual (FSM) 5140 and the Interagency Prescribed Fire Planning and Implementation Procedures Guide.

Hydrology

These design features were developed to ensure that the project has a high probability of meeting the following Region 5 Water Quality Management for Forest System Lands in California BMPs,[8] and the Shasta-Trinity National Forest LRMP Standards and Guidelines.

1. Table 2.1 below provides the minimum riparian reserve boundaries by category of streams and waterbodies (Forest Plan p. 4-53, 4-54).

Table 2.1. Minimum riparian reserve boundaries, by category.

Stream and Waterbody Category	Intermittent or Seasonally Flowing Streams	Fish-bearing Streams	Perennial Non-fish-bearing Streams	Springs	Seasonally Wet Meadows > 1 acre
Minimum Extent of Riparian Reserve Width	100 feet on either side of the channel	300 feet on either side of the channel	150 feet on either side of the channel	100 feet from the edges of riparian vegetation	150 feet from the edge of the meadow

2. Riparian reserves that encompass inner gorges would extend to cover the entire inner gorge area if it is greater than 150 feet in width.
3. Site specific riparian reserve maps will be provided prior to implementation. If dry streams show no sign of annual scour, they will be treated as seasonally flowing streams.
4. Broadcast and underburn prescribed fire would not be ignited within riparian reserves. Fire would be allowed to back into riparian reserves to promote a low-intensity backing fire.
5. No new fire line would be constructed.
6. Existing trails and hand lines used as fire lines would have erosion control structures constructed or reconstructed as needed following treatments to control surface flows and minimize off-site erosion. Mulch hand lines that have less than

[8] USDA Forest Service 2011, R5 Soil and Water Quality Handbook.

35 percent rock fragments with native material such as fine slash, organic matter and duff. Existing trails used as fire lines only need water bars (no mulching).

7. Installation of water bars on hand lines on ultramafic/Serpentine soils (Figure 2.3 and 2.4) will occur when soil moisture is sufficient to reduce hazard from Naturally Occurring Asbestos (NOA) (no or minimal dust created during water bar construction). Construct of reconstruct critical dips at all perennial stream crossings.
8. Maintain 80 percent stream shade where it already exists.
9. Prescribed fire would be designed to retain large dead woody debris (> 12 inches in diameter), both standing and downed, in riparian reserves within a range to meet historical levels (prior to suppression era) according to table 2.2 below. Seasonally wet meadows and similar riparian features that do not support recruitment of large woody debris would not be included.

Table 2.2. Range of LWD by Stream/Waterbody Category.

Stream and Waterbody Category	Intermittent or Seasonally Flowing Streams (tons/acre)	Fish-bearing Streams (tons/acre)	Perennial Non-fish-bearing Streams (tons/acre)	Springs (tons/acre)
Range of Desired LWD Loading (>12" dia.)*	15-30	35-60	30-50	20-40

From Brown et al. 2003, Knapp et al. 2005 and Uzoh and Skinner 2009

10. In order to protect spawning and incubating eggs, field personnel would not enter waterways where anadromous fish are determined to be spawning or eggs would be incubating, as determined and indicated by a fisheries biologist. Restricted time periods are generally from October 15 through June 15. Additional restrictions may be appropriate for waterways containing Spring Chinook salmon and summer-run steelhead, as determined by the District fisheries biologists.
11. To minimize the potential for cumulative adverse effects when underburning, no more than ten percent of a sixth-field watershed (or approximately 2,234 acres) would be burned in any one year.
12. Prescribed fire would be designed to result in a mosaic of low-intensity fire and unchanged vegetation within areas with very low or low burn probabilities with no more than 50 percent of the area having patches of high or moderate soil burn severities (missing litter of duff) except for highly erodible soils (soils developed from granitic parent material), where ground cover should be in excess of 90 percent and evenly distributed.
13. Best Management Practices (BMPs) would be implemented during all activities. A description of each applicable BMP is included in Appendix B of this EA.

Monitoring of implementation and effectiveness would follow existing protocol[9] and direction given in the National Best Management Practices for Water Quality Management on National Forest System Lands[10] to ensure that water quality objectives are being met.

Geology

Prescribed Fire in the Unstable Land Component of Riparian Reserves – Active landslides and inner gorges make up the unstable land component of Riparian Reserves on the Shasta-Trinity National Forest. These are primarily debris slides (shallow, rapidly moving landslides), and many appear to reach to near the ridge crest. Since treatments are primarily confined to ridge top locations, most inner gorges within the analysis area would not be affected. However, fire would be backed down into some creeks such as Virgin Creek, New River and Slide Creeks and could reach some inner gorges in those areas. The following design features apply:

1. Prescribed fire would be kept at low severity in active landslide areas and inner gorges.

Cave and Karst Resources – There is one known marble cave near the treatments area, and other marble caves are known to exist in the Limestone Bluffs Research Natural Area on the Klamath National Forest, about 1.5 miles northeast of the project area. Though marble outcrops are not mapped within the project area (none appear on the Forest's GIS bedrock layer), such bodies are often small and some may have been missed during bedrock mapping projects. The following design features apply:

1. No burning will occur within 200 feet of all known caves and marble outcrops.
2. Cave locations would be held confidential in accordance with the Federal Cave Resource Protection Act of 1988. Such information would be made available to appropriate implementation personnel as needed to protect cave resources from inadvertent damage during implementation.

Naturally Occurring Asbestos Hazard – Ultramafic serpentine occurs along the ridge crest from Election Gap to Salmon Mountain, with the largest outcrop (about a mile wide) near Mary Blaine Mountain, and a much smaller body (less than 0.25 mile wide) near Potato Mountain (see Figure 2.3 and 2.4 below). Ultramafic rock and soil often contain naturally occurring asbestos (NOA), where it occurs as a result of natural geological processes. Natural processes and human activities may disturb NOA-bearing rock or soil and release mineral fibers into the air, which pose a potential for human exposure by inhalation.

State, federal, and international health agencies have classified asbestos as a known cancer causing substance. It has been demonstrated that asbestos fibers can cause lung cancer and various other serious illnesses but symptoms might not appear for 15 to 40 years after exposure to asbestos. Exposure does not mean the recipient will definitely develop health problems. Factors such as type of asbestos, quantity, and duration and frequency of exposure are all important considerations. Knowing how to minimize or eliminate exposure is the best way to protect lung health and avoid possible adverse health effects. Any activity that creates dust where NOA is present has the potential to

[9] http://fsweb.wo.fs.fed.us/wfw/watershed/national_bmps/bmp_docs-fire.html.
[10] USDA Forest Service 2012.

cause harm unless mitigation and precautions are taken. The following measures are effective in minimizing exposure:

- Limit dust generating activities;
- Avoid dusty areas, especially in windy conditions;
- Drive slowly over unpaved roads, and keep windows and vents closed when in route to the project area;
- Spread out crews on fire lines and avoid generating dust clouds.

The following design features apply:

1. A map of all known ultramafic rock and soil (Figure 2.3 and 2.4) would be provided to field personnel prior to project implementation to inform personnel of the work area having associated health risks that require special protection measures to provide for safety. This map would be at a scale of 1:24,000 or larger or other appropriate electronic format (e.g. files for global positioning systems – GPS) and show roads, trails and existing fire lines overlain on ultramafic rock.
2. Fire line maintenance in areas underlain by ultramafic rock or soil (Figure 2.3 and 2.4) would be conducted during moist soil conditions to minimize dust generation.
3. A project-specific Job Hazard Analysis will include effective and feasible dust abatement measures tailored to the project area, such as deferment of trail erosion control until site conditions are moist and use of a respirator equipment as appropriate.

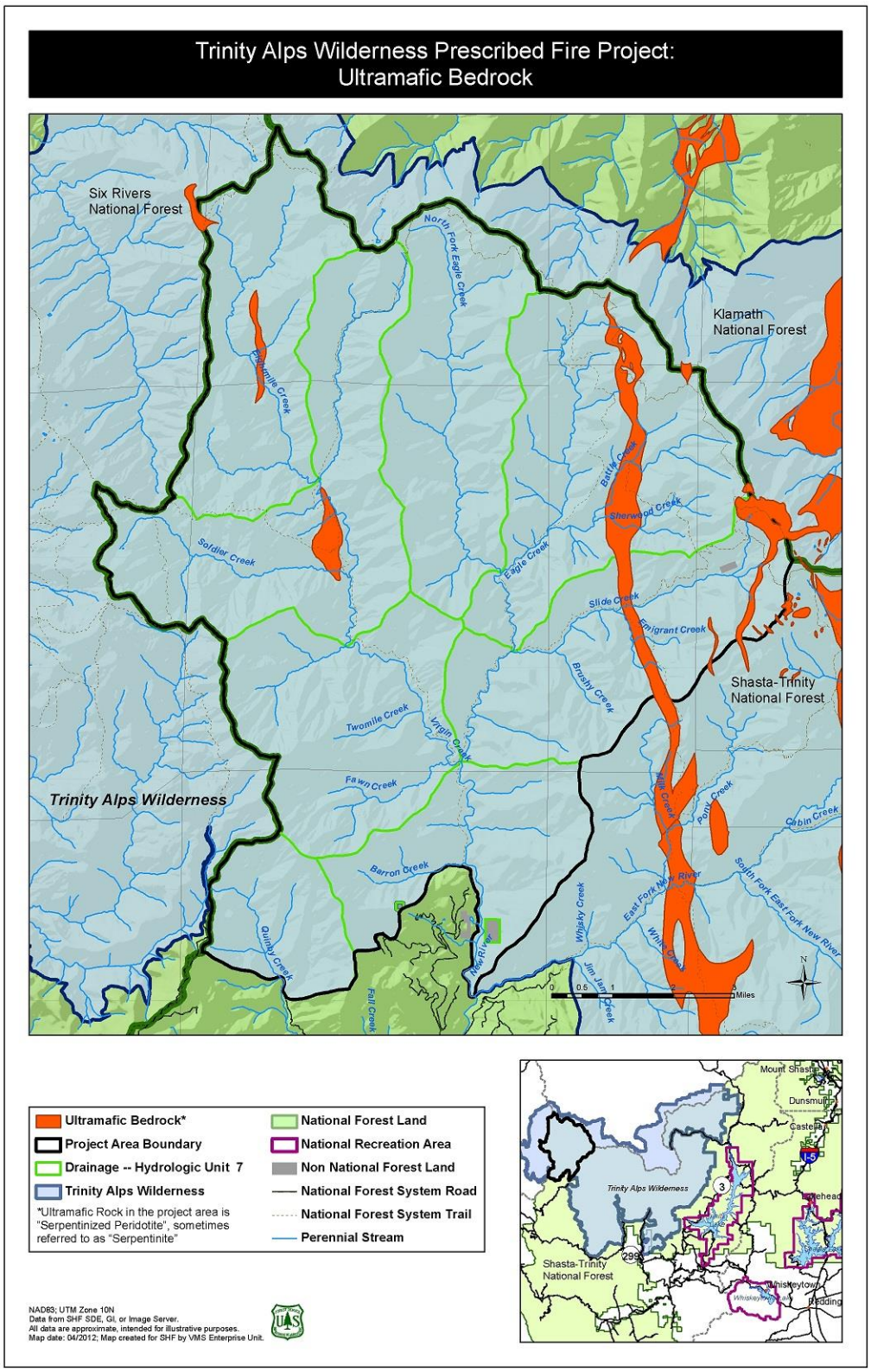


Figure 2.3. Occurrence of ultramafic bedrock (may contain naturally occurring asbestos).

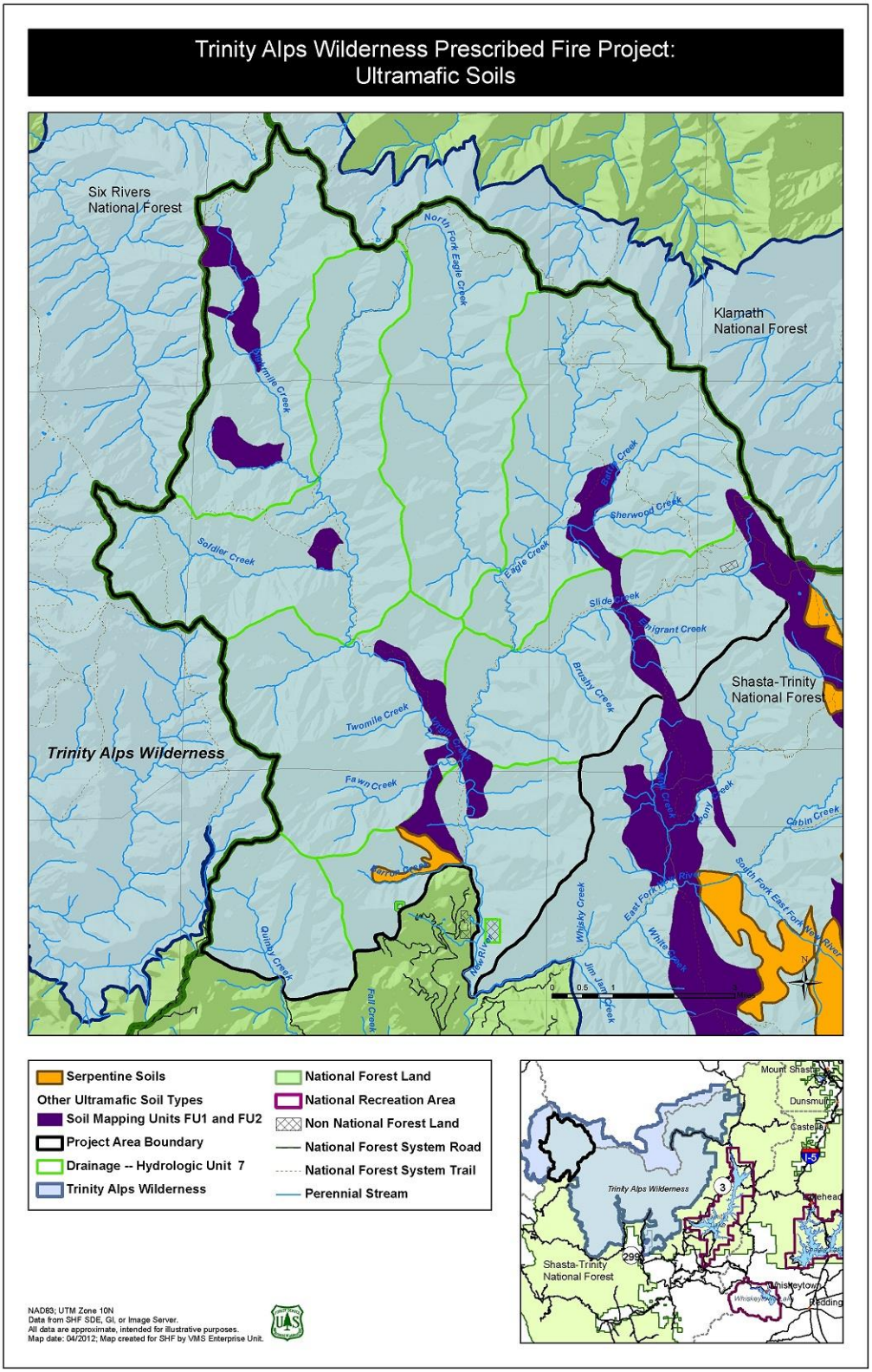


Figure 2.4. Occurrence of ultramafic soils (may contain naturally occurring asbestos).

Soils

The following soil resource design features have a high probability of reducing the effects of prescribed fire on soil productivity and maintaining the functionality of the soil resource. These design features were developed to ensure that the project has a high probability of meeting Best Management Practices, soil management direction[11] (and Shasta-Trinity National Forest LRMP Standards and Guidelines. Figure 2.5 on the following page displays soil types in the project area.

1. Post-treatment total soil cover should be between 50 and 70 percent on metamorphics, with at least 50 percent cover as fine organic matter (duff, plant leaves/needles, fine slash [less than 3-inch material], etc.).
2. On granitics, soil cover should be greater than 90 percent, with at least 50 percent cover as fine organic matter (duff, plant leaves/needles, fine slash [less than 3-inch material], etc.).
3. Retain existing down coarse woody debris (CWD) whenever possible. At least five logs per acre should be retained, with four to eight tons per acre of fuel remaining for protection of soil fertility. Desired logs are at least 20 inches in diameter and ten feet long.
4. Retain at least 50 percent duff and litter cover over the treatment area. If the soil and potential natural plant community are not capable of producing cover over 50 percent of the area, adjust minimum amounts to reflect potential soil and vegetation capacity.

[11] USDA Forest Service 2012.

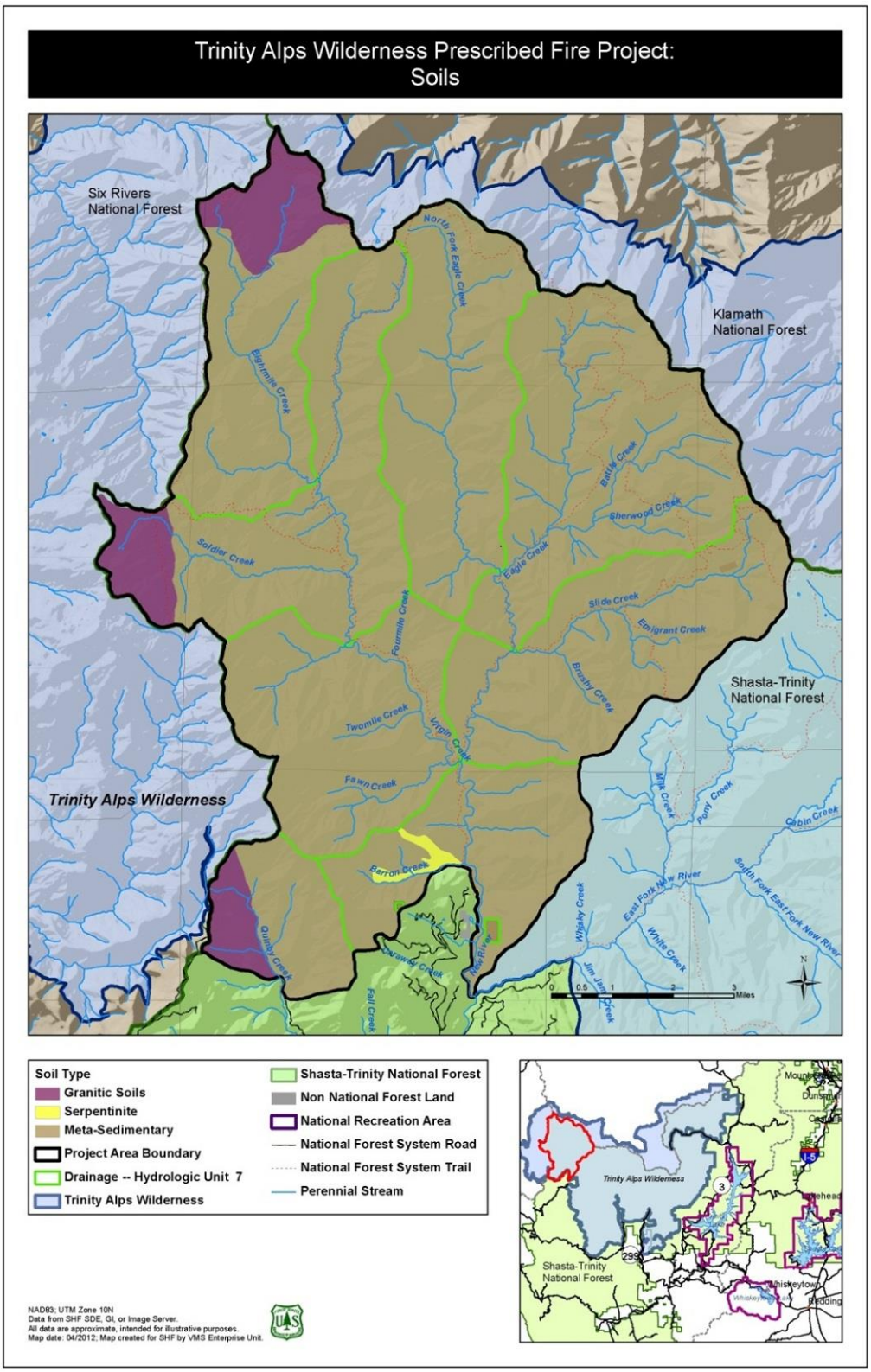


Figure 2.5. Soil types in the project area.

Cultural Resources

The following resource protection measures would be implemented under either action alternative to avoid or minimize impacts on historic properties and areas of cultural interest to Tribes.

1. If previously undocumented items protected by the Native American Graves Protection and Repatriation Act (NAGPRA) are encountered during project implementation, the activity must cease in the immediate area of the inadvertent discovery. Immediate notification of the Forest Supervisor, District Archaeologist and Forest Heritage Program Manager (HPM) would be made and a reasonable effort taken to protect the human remains and/or other cultural items.
2. The project Burn Plan and Amendments would be developed in consultation with the Karuk and Hoopa Valley Tribes (Tribes). A Forest and Tribal liaison would be established as a point of contact for the project and will be assigned by the Forest Supervisor and the Tribal Council. Copies of the Burn Plan and Amendment documentation shall be submitted to the Tribal liaison prior to project activity. Additionally, the project Burn Plan and Amendments would be developed through collaboration with the HPM to ensure adequate protective measures are in place for historic properties.
3. Pre-project planning meetings between Fire Management, the HPM or representative and Tribal representative/liaison would occur prior to planned project implementation.
4. Project implementation daily briefings would be open to and include an opportunity for the District Archeologist, HPM and Tribal monitors to communicate information to those implementing the project.
5. Pretreatment of culturally sensitive areas (such as the Devils Backbone, Salmon Summit and Salmon Mountain ridgeline) by bucking and hand dispersing heavy fuels (as allowed in the decision document) away from culturally sensitive areas would be completed taking into consideration firefighter safety. If tribal hand crews are available, they would be used for pretreatment of culturally sensitive areas. If available, a Forest Service archaeologist and/or Tribal monitor would monitor pretreatment project activities within culturally sensitive areas.
6. Point ignition away from culturally sensitive areas would be utilized when warranted as a site protection strategy.
7. Fire Management will have point protection contingencies in place, such as coordination with adjacent Forests, if fire spreads.
8. Historic property location and boundary marking information shall be conveyed for 05-14-54-00017, 05-14-54-176, 05-14-54-265, 05-14-54-266, 05-14-54-267, 05-14-54-268, 05-14-54-269, 05-14-54-270 during a pre-project implementation briefing to personnel assigned to work on the project.
9. Site boundaries for 05-14-54-00017, 05-14-54-176, 05-14-54-265, 05-14-54-266, 05-14-54-267, 05-14-54-268, 05-14-54-269 and 05-14-54-270 shall be delineated on a map, and GPS coordinates provided of site locations in order to avoid aerial ignition at these sites.

10. Post-project monitoring will occur within one year after completion of each phase of prescribed fire treatment. A Forest Service archaeologist shall conduct monitoring and if available, Tribal monitors shall assist.
11. For all cultural resource monitoring activities, a monitor report shall be completed and submitted to the Heritage Program Manager within 60 days.

Invasive Plants

1. New invasive plant occurrences found in the project area before or during project implementation by FS staff or partners will be verified by a qualified botanist.
2. A qualified botanist or designee will provide prevention training on invasive species to Forest Service and other staff prior to starting work.

Recreation, Scenery and Wilderness

1. Air quality design features (see above) would be implemented to reduce short- and long- term smoke impacts to recreationists.
2. Closure of trails and trailhead facilities would be implemented when proposed activities have the potential to be hazardous to the public. The public would be notified of trail closures through announcements in the local newspaper, post-office, and fire department, posting of signs at trailheads, and making information available at local District offices.
3. Where safety considerations and qualified personnel make possible, danger trees could be blasted to avoid the unnatural appearance of stumps
4. Trail work associated with using the trail as a fire line would be accomplished via non-mechanized (i.e. hand) methods. Chainsaws would only be used in specific instances where use of a crosscut saw is deemed unsafe (see the project Minimum Requirements Decision Guide in the project file).
5. Trails affected by project implementation activities will be restored to pre-project conditions, or better, following implementation and consultation with trails program manager.
6. The Forest's Wilderness Program Manager, or their delegate, will be included in decisions which could affect wilderness character, such as the use of mechanical transport or motorized equipment, including the review of project Burn Plans and Amendments.
7. Minimum Impact Suppression Tactics (MIST) and Forest Service Manual (FSM) 2324.23 direction for fire management activities in wilderness would be followed during all phases of implementation. Such tactics include, but are not limited to, the following:
    a. No new fire line is planned for implementation of prescribed fire. Existing fire lines and/or trails would be used.
    b. No new helispots would be constructed. Existing helispots would be used.
    c. Danger trees along system trails used as fire line would be flush-cut as close to the ground as possible and then covered with duff or other on-site

natural materials to minimize their appearance, or blasted to promote a naturally decayed appearance.

Wildlife Species of Special Concern

Northern Spotted Owl (NSO)

1. Seasonal Restriction of February 1 through September 15 on;
    a. Activities that create smoke that is likely to accumulate in the forest canopy within 0.25 mile of known nest cores and suitable nesting/roosting habitat.
    b. Activities that generate noise above ambient levels when they occur within 0.25 mile of an active nest site or unsurveyed nesting/roosting habitat, such as operation of helicopters or chainsaws.
2. No more than 50 percent of occupied or unsurveyed suitable nesting, roosting or foraging habitat would be treated in a single year in any one 7th-field watershed up to 3,500 acres in size.
3. Prescribed fire would be designed to retain downed logs of the largest diameter available at an average of 15-35 tons per acre where that amount exists, and to retain snags at an average of 2.5-4 snags per acre. Maintaining downed woody debris and snags within these ranges would provide habitat capability for northern spotted owl[12] (in addition to fisher, marten, northern goshawk, and northwestern pond turtle) at the Moderate or High threshold as described in Appendix G of the Forest Plan. This design feature would also meet the levels of downed woody debris and snags for pileated woodpecker, western gray squirrel and black bear recommended in Appendix G of the Forest Plan.

Northern Goshawk

The Limited Operating Period for the northern spotted owl (February 1 to September 15) would apply for protection from disturbance to unknown goshawk nests during nesting season, as the sensitive reproductive period for goshawks ends by August 15.

Survey and Manage and Sensitive Species
No treatments would occur within 100 feet of any spring or seep.

Comparison of Alternatives

Table 2.3 below provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives and whether or not the alternatives meet the purpose and need as described in Chapter 1.

[12] While no specific numbers of downed woody debris and snags are described for northern spotted owl, we believe that this meets the intent of the recovery plan for northern spotted owl (USDI Fish and Wildlife Service 2011).

Table 2.3. Comparison of effects of the proposed action, Alternative 3 and no action alternative with regard to meeting the purpose and need.

Purpose and Need Statement	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Additional Treatments)
Reduce the risks and consequences of wildfire occurring within the wilderness or escaping from the wilderness	Does not meet the purpose and need because current fuels conditions pose an elevated risk of 1. Uncharacteristic fire behavior (high rates of spread and resistance to control), and 2. fires escaping from the wilderness.	Meets the purpose and need in the treated areas for approximately 15-20 years because it would 1. reduce fuel accumulations resulting from past fires in the project area, 2. provide for a mosaic of treatments while allowing the use of MIST during future fire suppression operations, and 3. increase the landscape's resilence to severe wildfire	Meets the purpose and need as described by Alternative 2, with an added benefit of meeting the purpose and need on three sub-ridges on the west side of the Virgin Creek drainage.
Create a fuels condition that enables the use of minimum impact suppression tactics that make use of natural barriers, topography or watercourses	Does not meet the purpose and need because current fuels conditions in the project area and on strategic ridgelines in particular 1. may make fires more difficult to control using MIST, and 2. may threaten firefighter safety. 3. are not conducive to use of natural topographic features during fire suppression efforts in future wildfires.	Meets the purpose and need in the treated areas for approximately 15-20 years, during which 1. strategic ridgelines treated under this alternative would function as effective natural barriers to fire, and 2. the overall reduction of heavy fuel accumulations would increase the likelihood of successful control efforts using MIST. 3. create a landscape that is safer for firefighters to access and work and enables the use of minimum impact suppression tactics.	Meets the purpose and need as does Alternative 2, with the added benefit of strategic fuels interruption on three sub-ridges on the west side of the Virgin Creek drainage.
Permit lightning-caused fires to play, as nearly as possible, their natural ecological role within wilderness	Does not meet the purpose and need because 1. current fuels accumulations are beyond those of natural, pre-suppression era levels, and 2. future wildfires would likely exhibit high and uncharacteristic of natural pre-suppresion fire behavior.	Meets the purpose and need within current Forest Plan direction because the fuels treatments would 1. move the treatment area toward more historic occurring fuel levels, and 2. allow for more effective use of natural barriers to fire spread.,	Meets the purpose and need within current Forest Plan direction as does Alternative 2, with the added benefit of strategic fuels interruption on three sub-ridges on the west side of the Virgin Creek drainage..

Purpose and Need Statement	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Additional Treatments)
Reduce the risks and consequences of public health and safety concerns created by hazardous air conditions	Does not meet the purpose and need because it would 1. leave heavy fuels accumulation that would produce significant amounts of smoke in a wildfire event, as demonstrated in recent large fire events, and 2. limit opportunities for safe engagement of future fires, resulting in a higher likelihood of larger, longer lasting smoke production events.	Meets the purpose and need because it would 1. reduce hazardous fuel accumulations from past fires in the project area, resulting in overall smaller, shorter smoke production events during wildfires, and 2. create an interruption in fuels, which would be more likely to reduce size and duration of fires and associated smoke production than No Action.	Meets the purpose and need as does Alternative 2.

Table 2.4. Comparison of the proposed action, Alternative 3, and the no action alternative with regard to the issue indicators.

Issue and Issue Indicator		Alternative One (No Action)	Alternative Two (Proposed Action)	Alternative Three (Additional Treatments)
Air Quality	**Project activities may cause adverse effects on air quality.** • Predicted smoke emissions (PM_{10}, $PM_{2.5}$, and CO) based on fuel loadings, and • Coordination with State and local air quality districts and subsequent compliance through smoke management plans and monitoring procedures.	If high-severity wildfires were to occur, emission outputs could reach: PM_{10}=3,494, $PM_{2.5}$ = 2,961, CO=37,857[13] No coordination with State or local air quality districts, or compliance with smoke management or monitoring would be required.	If high-severity wildfires were to occur after treatments, emission outputs within treated areas could reach: PM_{10}=1,515 $PM_{2.5}$=1,313 CO=17,443[14] Implementation would be conducted following a prescribed fire implementation plan (i.e., smoke management plan), which stipulates fuels and meteorological conditions under which a prescribed fire may be ignited. Coordination with air-quality management officials, meteorologists, and fire management cooperators is mandated by agency policy and regulations.	Same as Alternative Two

[13] Emissions for a wildfire under the no action reflect a one-time wildfire event.
[14] Emissions for a wildfire after treatments are given for a one-time wildfire event.

Fire and Fuels	**Project activities may cause unplanned or adverse fire behavior effects and intensity.** • Predicted flame lengths, and • Predicted crown fire potential from project activities.	If a wildfire were to occur within the project area under the no action alternative, predicted flame lengths would be; 9,495 of very low/low, 1,357 acres of moderate, 1,286 acres of high, and 6,924 acres of very high. Predicted fire type would be; 9,363 acres of no burn/surface fire, 8,620 acres of passive crown fire, and 1,079 acres of active crown fire. * The maximum treatment acres from Alternative 3 was used as the baseline acres for comparison. ** See Appendix A, Glossary for flame length and fire type definitions.	If a wildfire were to occur within the project area after implementing alternative 2, predicted flame lengths would be; 10,737 acres of very low/low, 6,315 acres of moderate, 1,127 acres of high, and 908 acres of very high. Predicted fire type would be; 10,759 acres of no burn/surface fire, 8,191 acres of passive crown fire and, 136 acres of active crown fire.	If a wildfire were to occur within the project area after implementing alternative 3, predicted flame lengths would be; 11,048 acres of very low/low, 7,022 acres of moderate, 1,013 acres of high, and 5 acres of very high. Predicted fire type would be; 11,059 acres of no burn/surface fire, 8,024 acres of passive crown fire, and 5 acres if active crown fire.
Heritage Resources	**Project activities may cause undesired or adverse effects to heritage resources.** • Effectiveness of protection measures incorporated into project design features.	There would be no implementation of protection measures. If high-severity wildfires were to occur, this may impact cultural resources.	Pre-treatment of identified culturally sensitive areas within proposed treatment areas would disperse heavy downed fuel accumulations and hand/point ignition away from those locations. By flagging and avoiding identified sites, Alternatives Two or Three would not adversely affect historic properties.	Same as Alternative Two
Wilderness Values	**Project activities may cause undesired effects on wilderness values and character.** • Duration and intensity of noise disturbance, and	There would be no noise from project activities, however in the event of a wildfire noise disturbance would temporarily increase due to suppression	The noise and possible dust output of any chain saw use would be temporary, though potentially of moderate level. Timing of implementation could correspond to times of highest recreational	Same as Alternative Two

	• Achievement of assigned Visual Quality Objectives (VQOs), and • Compliance with the Wilderness Act of 1964.	equipment operation. Smoke disturbance from a wildfire would also likely affect the VQO's within the project area, as could suppression activities (dozer lines, etc.). These disturbances would negatively impact wilderness values. Compliance with the Wilderness Act is not required.	use. Overall recreation use within the project area is low, and the possible adverse effects to recreation are considered to be of a level that would be short-term and minor. The Project would help preserve long-term scenic values by maintaining openly-spaced larger trees. The project area would continue to meet the Primitive ROS class and would be consistent with the VQO of Preservation. Use of mechanized equipment, including helicopters and chainsaws, is generally prohibited by the Wilderness Act of 1964. A Minimum Requirement analysis has been completed (Appendix D of the EA) and approved by the Forest Supervisor for this project (see project record), which documents a project-specific exemption to this prohibition and ensures compliance with the Wilderness Act. Visibility and the sounds of mechanized equipment in the project area will be inconsistent with visitor expectations and wilderness values within the project area. This inconsistency will be of short and limited duration and is considered a less than significant impact.	

CHAPTER 3 – EXISTING CONDITION AND ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological and economic environments of the project area. The chapter then discloses the direct, indirect and cumulative environmental consequences of implementing each alternative and forms the scientific basis for implementation of one of the alternatives analyzed. Analysis methodologies, more detailed existing condition discussions and additional rationale for determinations of effects for each resource are disclosed in specialist reports, biological assessments and biological evaluations, which are hereby incorporated by reference and are available in the project record for this EA.

Direct environmental effects are those that occur at the same time and place as a specific cause or action. Indirect effects are those that either occur sometime after or are spatially removed from an activity. Cumulative effects under NEPA result when the incremental effects of actions are added to the effects of past, current and reasonably foreseeable actions, regardless of what agency or person undertakes such actions. This is different than the definition of cumulative effects under the Endangered Species Act, which states that cumulative effects on the environment are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02).

For cumulative effects, "past actions" are those actions that occurred within the cumulative effects analysis area for a given resource; these may include trail construction, fire suppression and wildland fires, unless otherwise defined. "Foreseeable actions" are anticipated future actions including trail use and maintenance and wildfire suppression, again unless as otherwise defined. A summary of relevant past, current and foreseeable actions and events for the project is in Chapter 3 (see Table 3.3). Resource specialists considered these past, current and foreseeable actions as appropriate to their analyses and based on the cumulative effects analysis area described for each resource.

Cumulative effects can result from individually minor, but collectively substantial, actions taking place over a period of time. Accordingly, and consistent with Council on Environmental Quality (2005) guidance, past, current and foreseeable actions were assessed along with the effects of the alternatives to determine whether substantial cumulative effects may occur. A preliminary analysis of significant impact is presented in Appendix H of this EA.

Minor discrepancies in acreage reported in this chapter and other sections, text documents, appendices and reference documents are due to rounding and/or differences in resource analysis areas and methodologies employed by specialists for assessing impacts of the alternatives. Such minor differences would not in any way compromise the analyses or conclusions.

Past, Current and Reasonably Foreseeable Actions

The Council on Environmental Quality's (CEQ) regulations (40 CFR 1500 - 1508) implementing the procedural provisions of the National Environmental Policy Act NEPA) of 1969, as amended (42 USC 4321 *et seq*.), define cumulative effects as,

> "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."(40 CFR ~ 1508.7)

In accordance with guidance provided by 36 CFR 220.4(f) (dated July 24, 2008), for this EA past actions and events pertinent to each resource form the baseline for the existing condition of that resource. Reasonably foreseeable future actions, in the context of NEPA analysis, are considered to be those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals (USDA Forest Service 2008). Identified proposals for Forest Service actions are described in 36 CFR 220.4(a)(1) as follows:

> "The Forest Service has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated (see 40 CFR 1508.23)."

Accordingly, the Forest Service generally considers actions or events that can be predicted both spatially and temporally and/or proposed actions described in the current Schedule of Proposed Actions (SOPA) to be reasonably foreseeable.

Conversely, actions or events that may occur in the project area but that 1) cannot be predicted either spatially or temporally (such as future wildfires and wildfire suppression), or 2) for which there is no current proposal, are not considered to be "reasonably foreseeable" in the context of NEPA.

Current, ongoing and reasonably foreseeable actions are considered in cumulative effects analysis as appropriate for each resource and depending on that resource's cumulative effects analysis area.

The only reasonably foreseeable actions within the cumulative effects area of the Trinity Alps Wilderness Prescribed Fire Project are ongoing trail maintenance and suppression of naturally occurring wildfires.

Table 3.3 below summarizes past actions and events that contributed to the current condition in the Trinity Alps Wilderness Prescribed Fire Project area or in the cumulative effects analysis area for one or more resources, as well as ongoing activities. Actions and events listed in the table were derived from the FACTS database and District personnel knowledge.

Table 3.3. Past, current/ongoing and reasonably foreseeable future actions and events

Activity	Description	Date(s)	Location	Scope
Miscellaneous fires	Wildfires	1910-1980	In and adjacent to the project area	38,120 acres within wilderness, 768 acres within project area
1987 Complex	Wildfires	1987	Throughout the wilderness but outside the project area	35,252 acres within wilderness
Megram	Wildfire	1999	Mostly within but also adjacent to project area	70,351 acres within wilderness, 49,008 within project area
Bar Complex	Wildfire	2006	In and adjacent to project area	94,596 acres within wilderness, 7,460 within project area
Iron Alps Complex	Wildfire	2008	Portions within project area, portions outside project area but within wilderness	30,548 acres within wilderness, 3,708 acres within project area
Backbone (including Redspot and Trinity Fires)	Wildfire	2009	Mostly within but also adjacent to project area	5,162 acres within wilderness, 4,501 acres within project area
Corral Complex	Wildfire	2013	Mostly outside the project area, portions adjacent to or within the project area	Approximately 800 acres within the project area, 125 acres within proposed treatment areas
River Complex	Wildfire	2015	Mostly outside the project area, portions adjacent to or within the project area	Approximately 6,055 acres within the project area, 2,285 acres within the proposed treatment areas
Trail Use and Maintenance	Trail maintenance activities according to wilderness management direction (FSM 2323.13f)	Past, current and ongoing	Throughout the wilderness, including within and outside the project area	Approximately 71 miles of trail within the project area, of which 55 miles have been maintained within the last 5-10 years.
Wildfire suppression	Suppression of naturally occurring wildfires	Past, current and ongoing	Throughout the wilderness, within and outside the project area	Fires have occurred on ~65,000 acres within the project area since 1910 (including acres re-burned), with varying levels of active suppression.

Air Quality

Existing Condition

The major air pollutant concern from prescribed and unplanned fires is the smoke produced by the consumption of combustible materials. Smoke is comprised of fine particulates (measured as PM_{10} and $PM_{2.5}$), carbon monoxide, carbon dioxide, mono-nitrogen oxides, sulfur oxides and ozone. Particles over about 10 microns, consisting of ash and partially burned plant matter, are mostly associated with high-intensity fires and remain suspended for only a short period of time. Particulate emissions depend on the duration of combustion phases (preheating, flaming, glowing and smoldering), fuel moisture, rate of energy release, and type of fuel consumed.

Air quality was noticeably poor at various times in Northern California in the summers of 1999, 2006 and 2008 due to large wildfires in the Shasta-Trinity, Klamath, and Six Rivers National Forests. Monitoring at the community of Hoopa, California indicated that, as a result of the Big Bar Complex (1999), California 24-hour PM_{10} standards were exceeded on 19 days and the federal standard was exceeded on 12 days. During several days, average PM_{10} standards exceeded 420 $\mu g/m^3$; such a level is considered hazardous. The smoke from the fires precipitated the first declared state of emergency in a California county due to air pollution (Herr 1999).

Currently, the project area is in attainment for all federal and state standards except for the state standard for PM_{10}. In Trinity County, the primary sources of pollutants contributing to the non-attainment designation for PM_{10} are wood stoves, wind-blown dust from dirt roads and agriculture, and open burning from backyard burns and prescribed burns (Trinity County 2009).

As fire risk and high fire behavior potential in the analysis area increase, periods of poor air quality during wildfires are more likely to occur.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

No direct effects to air quality would occur with implementation of the no action alternative, since no prescribed fire would be implemented and no smoke production would occur.

With current management strategies in place, air quality would remain at current levels in the absence of a wildfire. However, the risk of recurring large fires would increase under this alternative, and the continued accumulation of fuels would hamper future suppression efforts. As a result, future fires in the project area are likely to be of longer duration and more severe than under either action alternative. These wildfires would occur:

- Within a landscape where large diameter fuel loadings that are higher than what historically occurred would be consumed. With more available fuels to burn, the amount of smoke produced would be greater.
- With higher levels of larger diameter fuels consumed over a longer period of time. Emissions under such a scenario would be predicted to occur for much longer than would be typical of historic conditions.
- When air quality and meteorological conditions are unpredictable, leading to the potential for large amounts of smoke production under less than optimum conditions for dispersal.
- When wildfires are likelier to burn for longer periods with less success in suppression operations because of risks to firefighters and an increased resistance to control.

Air quality conditions under no action would, therefore, be similar to current conditions but with periods of severe degradation during wildfires in the summer months. As demonstrated by recent fires (see above), air quality standards could at times be in non-compliance with federal, regional and local standards, and smoke could be expected to have adverse effects to surrounding communities, potentially for many weeks at a time.

Cumulative Effects

As noted above, air quality under the no action alternative would likely be maintained at current levels, but with periods of extremely poor conditions during wildfires that would likely be large, severe and of long duration. Implementation of this alternative, especially when coupled with ongoing fire suppression, would increase the potential for protracted periods of poor air quality during future fires, which in turn would increase health hazards to firefighters and the public.

Alternative 2 – Proposed Action

Emission estimates for the action alternatives were quantified through the First Order Fire Effects Model (FOFEM). The results of the calculations are displayed in the following table and represent the predicted direct effects of the action alternatives. The qualitative discussion of direct effects under Alternative 2 also applies to Alternative 3 and is presented below under Effects Common to Both Action Alternatives.

Direct Effects

Tables 3.4 below display the predicted PM_{10}, $PM_{2.5}$ and carbon monoxide (CO) emissions under Alternative 2.

Table 3.4. Predicted smoke emissions for no action in the event of a wildfire, for the action alternatives during prescribed fire, and after treatments are completed during a wildfire in lbs. /acre.

Emissions	No Action (w/wildfire)*	Alternatives 2 and 3 (during prescribed fire)**	Alternatives 2 and 3 (post treatments w/wildfire)***
PM_{10}	3,494	3,118	1,550

Emissions	No Action (w/wildfire)*	Alternatives 2 and 3 (during prescribed fire)**	Alternatives 2 and 3 (post treatments w/wildfire)***
$PM_{2.5}$	2,961	2,642	1,313
CO	37,857	34,970	17,443
CH_4	1,791	1,598	797
CO_2	176,270	157,092	74,568
NO_x	31	27	7
SO_2	139	124	60
Total Modeled Emissions	222,543	199,571	95,738

*Emissions for a wildfire under no action reflect a one-time wildfire event.
**Emissions under the action alternatives during prescribed fire would be stretched out over approximately ten years with approximately 2200 acres per year.
***Emissions for a wildfire after treatments are complete are a one-time wildfire event.

Alternative 3 – Additional Treatment Areas

Direct Effects

Tables 3.4 above display the predicted PM_{10}, PM_{25} and CO emissions from implementation of Alternative 3. The qualitative discussion of direct effects under this alternative also applies to Alternative 2 and is presented below under Effects Common to Both Action Alternatives.

Effects Common to Alternatives 2 and 3

Direct Effects

Either action alternative would generate short-term smoke emissions suspended in the atmosphere from prescribed burning. Emission rates vary by fuel consumption and related factors including fuel loading, fuel moisture, ignition pattern(s) and length of combustion phases. It is generally accepted that smoke production from prescribed fires is of shorter duration and of less volume than from wildfires occurring in similar vegetation types during the unpredictable meteorological conditions, ignition patterns, fuel loading and fuel moistures of a typical fire season (NWCG 2001).

Predicted smoke emissions from Alternatives 2 and 3 actions are estimated to be slightly less than during a wildfire under the no action alternative. However, the prescribed fire treatments would occur across approximately 10 percent of any sixth-field watershed (approximately 2200 acres) per year over ten years. Whereas, a wildfire could potentially consume up to 100,000 acres over a two to three-month period as what occurred in 2008,

2006, and 2015. Ultimately, emissions during a wildfire, after proposed treatments are completed, would yield a 54% reduction compared to predicted emissions during a wildfire with the no action alternative. In addition, since the number of acres burned during implementation of either action alternative can be controlled (through the amount of ignition and occurring when meteorological conditions are favorable), adverse impacts to sensitive areas near the project area are not expected to occur.

Smoke emissions during prescribed burning may temporarily reduce visibility in some locations within the project area and surrounding drainages, but are not likely to affect overall visibility trends at the annual and decadal scale. However, implementation of smoke management practices and plans, and burning during favorable weather conditions when smoke is carried away from Class I and II airsheds and other sensitive areas would minimize visibility impairments. Smoke impacts and limited visibility may affect wilderness visitors and nearby residents for short periods during and immediately after implementation. PM_{10}, $PM_{2.5}$, mono-nitrogen oxide and sulfur oxide emissions from prescribed burning would contribute to local, air basin and broader regional pollutant loading, but contributions would be confined to remote areas and would be unlikely to influence design values for NAAQS at local air district monitoring sites.

Implementation would be conducted following a prescribed fire implementation plan (i.e., burn plan), which stipulates fuels and meteorological conditions under which a prescribed fire may be ignited. Coordination with air-quality management officials, meteorologists, and fire management cooperators is mandated by agency policy and regulations. As the extent and timing of ignition greatly influence smoke production and management, implementation would occur when proper meteorological circumstances occur for dispersion purposes (e.g., favorable wind direction, adequate transport winds, etc.) Periods of poor air quality resulting from implementation of either action alternative are unlikely. To date, there have been no air quality violations directly related to prescribed fire activities on the Shasta-Trinity National Forest.[15]

Indirect Effects

Once the treatments are completed, they would aid in future suppression efforts by giving fire managers more options for active management in the project area – such as implementing firing operations on days that favor optimal dispersal of smoke.

As the project area trends toward historic fuel loading levels, smoke production during future wildfires would decrease due to less fuel being available for consumption and fewer active days that a fire would be expected to burn. Wildfires occurring within the treated areas would likely experience even greater reductions in smoke production, largely due to the reduced large diameter fuels areas compared to untreated portions of the project area.

Cumulative Effects

With implementation of either action alternative, the potential for long periods of severely degraded air quality during future wildfires would be lower than under no

[15] Boyer 2011 personal communication.

action. While short-term increases in smoke production during wildfires would be expected to occur, prolonged periods of very poor air quality that have characterized recent wildfires would be much less likely to occur. In summary, both action alternatives would have primarily beneficial effects to air quality by trending the landscape toward historic fuel loads and, consequently, fire frequencies and fire behavior.

Fire and Fuels

Existing Condition

Fire History in the Trinity Alps Wilderness

On the western edge of the Klamath Mountains, median fire return intervals historically ranged from 15 to 26 years (Stuart and Salazar 2000), and lower elevation mixed conifer forests burned every 5 to 19 years (Fry and Stephens 2006, Taylor and Skinner 2003). With frequent fire of low to mixed severity, fuel accumulations over most of the area were historically maintained at low levels, and landscape features such as ridge-tops and streams were often sufficient to impede fire spread (Taylor and Skinner 2003).

Since the onset of fire suppression in the early 1900s, and with the increased effectiveness of mechanized suppression techniques (fire engines, aircraft, etc.) in later years, most of the fires were, until recently, kept small. Figure 3.4 below shows the amount of acres burned by decade within the Trinity Alps Wilderness over the past 70 years.

With successful fire suppression, fuels and vegetation density have increased and fires have become more intense and difficult to control, especially in the western half of the Alps. Examples of fires burning, at least in part, within the wilderness are described in detail in the project Fire and Fuels Report (see the project record).

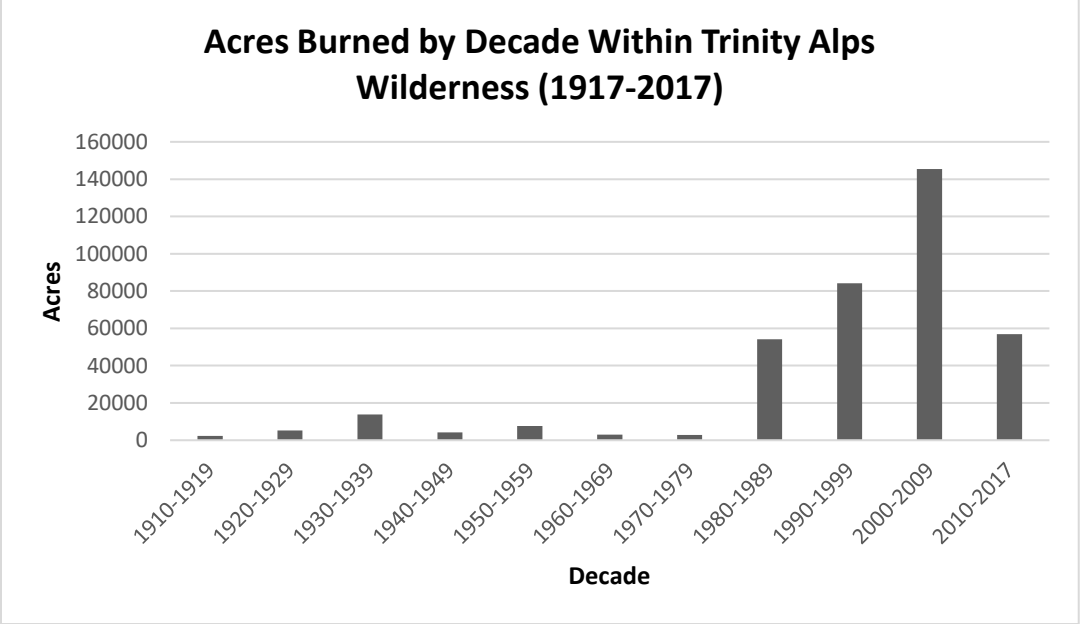


Figure 3.5. Acres burned in the Trinity Alps Wilderness from 1917 to 2017.

Recent Fire History in the Project Area

Past fire suppression and the Big Bar Complex of 1999 created vegetation and fuels conditions within the project area that are conducive to large fire growth and large areas of high severity fire, the most recent examples of which include the Backbone and Red Spot fires of 2009 (see Figure F.5 in Appendix F).

Dense brush combined with a high density of snags and large dead and downed woody debris left over from past fires created conditions that made these 2009 fires difficult to control and threatened firefighter safety. Large snags and downed woody debris fuel types produce more smoke for a longer duration (due to smoldering) than any other fuel type in the area. These fuel types also helped carry the Backbone and Red Spot fires during a time of high live fuel moistures in brush species.

Numerous snags were felled during construction of indirect fire suppression lines, which the fires never reached, and in which no other fuels mitigations were implemented; these lines now have heavy accumulations of large dead and downed woody debris. Many of these indirect hand lines occur on ridgelines that were historically used to stop fires. The ridgelines are important to fire suppression efforts because, given the area's steep topography, often the only viable option for impeding fire growth is at streams, natural barriers and ridgelines.

During the summer of 2015, the River Complex burned on the Six Rivers and Shasta-Trinity National Forests. Lightning caused fires that ignited on July 31 grew together to form the complex, burning approximately 77,805 acres. Approximately 6,055 acres burned within the project area, and 2,285 acres burned within actual treatment units.

A summary of vegetation burn severity from the River Complex shows that approximately 70% of the acres that burned within the project area resulted in unchanged to low-fire severity effects to vegetation. Approximately 12% resulted in moderate and 17% in high-fire severity. The only proposed treatment areas that burned during the River Complex were in the 'Salmon Summit to Fawn Ridge' area (120 acres) and 'Fawn Ridge South' area (2,165 acres). The majority of fuel and vegetative conditions within the project area following the River Complex still presents a risk of wildfires escaping from the wilderness onto adjacent lands and the potential for uncharacteristic fire behavior due to high fuel concentrations.

Existing Condition

Fire Frequency

According to Shasta-Trinity National Forest GIS data, nine fires of 1,000 acres or more have occurred in or entered the project area over a 71-year period (1938 to 2009). Over the last 30 years (1979 to 2009) approximately 60 fire starts occurred within the project area. See Figure F.1 in Appendix F.

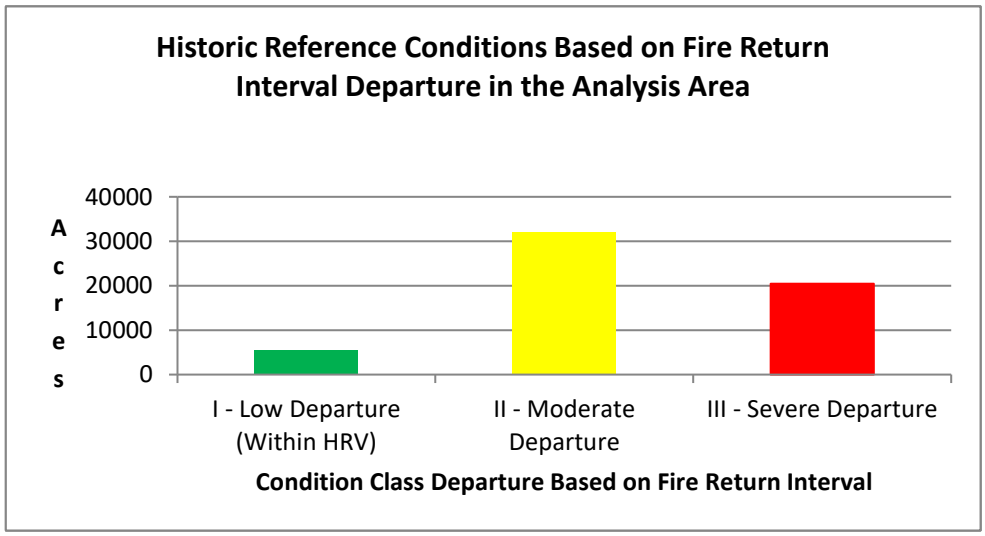
Historical and current regional dominance types[16] were primarily Douglas-fir, mixed-conifer, red fir and white fir; however, seral stage distributions have changed through time. Historically, approximately 90 percent of the project area supported vegetation at or below a fire return interval (FRI) of 20 years (Fire Regime I) based on Fire Return Interval Departure GIS data provided by the Region 5 Ecology Program. See table 3.6 below.

Table 3.6. Historic fire return intervals (FRI) in the project area.

Historic FRI (years)	Acres	Percent of Area
≤ 20	52,336	90%
>20 and ≤ 35	3,533	6%
> 35 and ≤ 60	2,203	4%
>60	277	< 1%

The number of fire occurrences on a given portion of the project area was measured by the departure from historic fire return intervals. Figure 3.6 below depicts condition class by approximate acres of fire return interval departure. Approximately 91 percent of the project area has missed at least three fire intervals, with some areas having missed as many as six intervals; this level of departure from historic fire return intervals places most of the project area in fire regime condition class 3 – severe departure (NIFTT 2010).

Figure 3.7. Historic reference conditions (condition class) based on fire return interval departure.



Fuels

About 67 percent of the project area is represented by the timber understory and timber-litter fuel models. The fuel models (Scott and Burgan 2005) are summarized in Table 3.8 below:

[16] Regional dominance types are fully described in the project Vegetation Report (see the project record).

Table 3.8. Fuel model descriptions within the project area by acres and percentage of area*.

Fuel Model	Acres of fuel model in project area	Percent of project area
Non-Flammable (e.g., open water, urban development, or bare ground)	138	<1%
Grass-Shrub The primary carrier of fire in this fuel model is grass and shrubs combined; shrubs are about 1 foot high, grass load is low; spread rate is high; flame length moderate	3,276	6%
Shrub Shrub fuel loads vary from moderate to heavy; fuelbed depths vary from about 1 foot to 4-6 feet; spread rates and flame lengths vary from moderate to very high. Approximately 5,080 acres characterized by this fuel model (9% of the project area) are characterized by heavy fuel loads and very high spread rates and flame lengths.	13,846	24%
Timber Understory Characterized by heavy forest litter with a shrub or small tree understory; spread rate is moderate; flame length high.	19,774	34%
Timber-Litter Fuel loads vary from low to very high; spread rates vary from very low to moderate; flame lengths vary from very low to moderate. Most of the project area characterized by this fuel model (13,462 acres or 23%) is characterized by moderate fuel loads, very low to low spread rates, and very low to low flame lengths.	19,362	33%
Other Other fuel models within the analysis area less than 1,000 acres each make up a small percentage of the total area.	1,953	3%

*GIS vegetation data and fuel models supplied by the California Fuels Landscape (see the project record).

Fire Behavior

Flame Lengths under 90th Percentile Conditions

Flame lengths serve as a measure of how intense or severe a fire may become and as a proxy for ease of fire suppression to model and predict fire behavior[17]. Table 3.9 below and Figure F.8 in Appendix F display predicted flame lengths in the project area under 90th percentile conditions.

[17] See Appendix A, Glossary for a definition of very low, low, moderate, high and very high flame length.

Table 3.9. Current predicted flame lengths and crown fire potential, expressed in acres by category, in the project area*.

Flame Length Potential (acres)	Very Low	Low	Moderate	High	Very High
	138	29,752	3,797	3,265	21,443
Crown Fire Potential (acres)	**Non-Burnable**	**Surface Fire (acres)**	**Passive Crown Fire (acres)**	**Active Crown Fire (acres)**	
	138	29,458	26,025	2,774	

* based on modeling under 90th percentile conditions.

Crown Fire Potential under 90th Percentile Condition

Crown fire potential is a measure of how severe a fire may become under specified conditions. Canopy characteristics (e.g. canopy base height, canopy bulk density, stand height, and foliar moisture content), ladder fuels, and fuel loading are all factors that determine crown fire potential. Table 3.9 above and Figure F.9 in Appendix F display current crown fire potential in the project area under 90th percentile conditions.

Fire Risk, Fire Hazard and Values at Risk

The Shasta-Trinity National Forest undertook a re-examination of the integrated vegetation management process in 2009. This process, known as the Integrated Vegetation Management Strategy, characterizes vegetation and its inherent availability to burn in a wildfire. A hazard, risk, and value analysis was used for the strategy. Hazard describes fire behavior potential, which has implications for resource damage as well as suppression capability. Risk is the likelihood of a fire occurring based on wildfire history. Value refers to the monetary, ecological, or political significance of a defined area.

The strategy resulted in a set of scheduled treatments across a 20-year time frame, with the focus on the first five years (USDA Forest Service 2010). The analysis concluded that the project area and many adjacent lands are considered a high priority for treatment over the next five years. In other words, the existing conditions ranked high in terms of risk, hazard and value.

Environmental Consequences

Alternative 1 - No Action

Direct Effects and Indirect Effects

With no change in current management of the project area under the no action alternative, there would be no direct effects. Indirectly, implementation of this alternative would likely result in burn probabilities, predicted flame lengths and crown fire potential similar to existing conditions in the event of a future wildfire (see Table 3.9 above and Figures F.7-F.9 in Appendix F).

Cumulative Effects

The cumulative effects analysis area for fire, fuels and vegetation is the project area. This includes approximately 58,349 acres. The project area was chosen as the analysis area because this provides the most comprehensive display of effects to fire and fuels from implementation of the alternatives. While the alternatives may change the risk of future fires entering or leaving the project area, the alternatives would not be expected to affect fire behavior outside the project area. The time period for analysis of cumulative effects is 20 years from completion of project activities or, in the event of selection of the No Action alternative, 20 years from the date of the decision. Beyond this time period the effectiveness of fuels treatments would be predicted to diminish with the continued suppression of fires within the wilderness.

The continued accumulation of untreated fuels would increase the potential of high-severity re-burn within the project area. This scenario is illustrated by the Backbone and Red Spot fires of 2009, which burned approximately 6,900 acres (49 percent of which exhibited moderate- to high-severity fire effects). The fire behavior resulting from unusually high accumulation of fuels increases a fire's intensity and the probability of spotting. It also produces a more challenging fire environment for firefighters to work in with the increased threat from rolling material and snags.

Current management response to wild land fire for the project area is limited to direct fire suppression. Under this alternative, therefore, the existing fuel accumulations would not be reduced. Fuels and understory vegetation would continue to accumulate, especially as trees killed by recent wildfires become available for consumption in future fires as either standing or downed fuels.

As time passes, falldown of standing material killed during recent fires and as a result of any subsequent mortality would continue to increase the surface fuel loading, particularly of larger diameter material. This downed coarse woody debris would exhibit some decay and would support a long period of burning, resulting in high severity effects to vegetation and soils where large woody material is present. In addition, regeneration of vegetation would provide a continuous surface fuel bed and ladder fuels that promote fire spread and increase crown fire potential. Currently the fuel loading within the project area is estimated to be as high as 75 tons per acre and, when combined with standing dead material that is likely to fall in coming years, an additional 50 tons per acre may accumulate in some areas.

The continued accrual of large diameter fuels from recent fire events within the project area would present problems to fire managers. This is often described by an adjective rating referred to as "resistance to control", which is an estimate of the fire suppression forces required to control a unit of fire perimeter (Brown 1995). Brown (1995) indicated that large diameter fuel loading exceeding 45 tons per acre is defined as "extreme" resistance to control, with a "high" rating ranging from 25 to 45 tons per acre. The no action alternative would maintain or perhaps increase resistance to control by promoting a fire environment characterized by copious amounts of large diameter fuels and snags and early seral vegetation that provides continuous surface and ladder fuels.

Implementation of no action would have adverse effects on fire management by allowing the continued accumulation of fuels at levels that would increase the size, intensity,

severity and resistance to control of future wildfires. Implementation of this alternative would, therefore, increase the risk to firefighter and public safety and the potential for damage to natural resource and cultural values during future wildfires. In addition, the potential of fire spread to and from the project area would increase.

Historically, approximately 90 percent of the analysis area supported vegetation at or below a fire return interval (FRI) of 20 years (Safford et al. 2011). Given the historical FRI, the process to re-establish fire's natural role would be estimated to be between 40 and 60 years without any management influence – including prescribed fire and suppression of wildfires. However, in the absence of active management to reduce fuels, the Forest Service would have few options to manage future wildfires. Full suppression of fires within the project area would continue, which would further contribute to fire behavior and effects that are beyond what occurred historically. It is unlikely that a more historically accurate fire regime would return to the landscape, and future fires would likely produce unacceptable effects to project area resource values.

Alternative 2 – Proposed Action

Direct Effects and Indirect Effects

Under Alternative 2, approximately 16,709 acres within the project area would be treated. The treatments would accomplish strategic fuels reduction along ridgelines, with fire backing down the slopes. The qualitative discussion of direct and indirect effects applies to Alternatives 2 and 3, and is presented below under Effects Common to Both Action Alternatives.

Indirectly, implementation of this alternative would likely result in predicted flame lengths and crown fire potential in a future wildfire as displayed in Table 3.10 below and Figures F.10-F.12 in Appendix F.

Table 3.10.Predicted flame lengths and crown fire potential in a future wildfire, expressed in acres by category, under Alternative 2*.

		Very Low	Low (0-4 ft.)	Moderate (4-8 ft.)	High (8-12 ft.)	Very High (>12 ft.)
Flame Length Potential (acres)	Pre Treatment	58	8,377	1,174	1,057	6,018
	Post Treatment	59	9,618	6,132	898	2
		Non-Burnable	**Surface Fire (acres)**	**Passive Crown Fire (acres)**	**Active Crown Fire (acres)**	
Crown Fire Potential (acres)	Pre Treatment	58	8,248	7,434	945	
	Post Treatment	0	9,702	7,005	2	

*The figures assume a wildfire under 90th percentile weather conditions after the proposed treatments.

** Re-projections made in ArcGIS due to the varying datum that initial layers and output data are projected to can lead to a geometry discrepancy of less than 1%. Process methodology is designed to minimize this error and data is presented as approximations.

Alternative 3 – Additional Treatment Areas

Direct Effects and Indirect Effects

In addition to all of the treatments under the proposed action, Alternative 3 would reduce fuels in three additional areas in the Virgin Creek drainage, for a total of approximately 19,088 acres of fuels reduction. The additional treatments would target strategic ridgelines in that drainage. Indirectly, implementation of this alternative would likely result in predicted flame lengths and crown fire potential in a future wildfire as displayed in Table 3.11 and Figures F.13-F.15 in Appendix F. The additional treatments would enhance the effectiveness of prescribed fire as proposed under Alternative 2 and would further benefit future fire suppression efforts.

Table 3.11.Predicted flame lengths and crown fire potential in a future wildfire, expressed in acres by category, under Alternative 3*.

Flame Length Potential (acres)		**Very Low**	**Low (0-4 ft.)**	**Moderate (4-8 ft.)**	**High (8-12 ft.)**	**Very High (>12 ft.)**
	Pre Treatment	58	9,437	1,357	1,286	6,924
	Post Treatment	71	10,977	7,022	1,013	5
Crown Fire Potential (acres)		**Non-Burnable**	**Surface Fire (acres)**	**Passive Crown Fire (acres)**	**Active Crown Fire (acres)**	
	Pre Treatment	58	9,305	8,620	1,079	
	Post Treatment	0	11,059	8,024	5	

*The figures assume a wildfire under 90th percentile weather conditions after the proposed treatments.
** Re-projections made in ArcGIS due to the varying datum that initial layers and output data are projected to can lead to a geometry discrepancy of less than 1%. Process methodology is designed to minimize this error and data is presented as approximations.

As noted above, the qualitative discussion of direct and indirect effects applies to both action alternatives and is presented below.

Cumulative Effects

The cumulative effects of Alternatives 2 and 3 are essentially the same and are discussed below under Effects Common to Both Action Alternatives. However, the addition of three treatment areas under Alternative 3 would supplement the beneficial effects of Alternative 2. Future fires within the larger Virgin Creek drainage would become more self-regulated in size through interaction with previous treatments and/or fires.

Effects Common to Alternatives 2 and 3

Direct Effects

The moderated conditions under which prescribed fire would be implemented would safely reduce fuels accumulated from recent wildfires. Both action alternatives would be predicted to reduce the total fuel available in the treated areas by as much as 68 percent, with large diameter fuels predicted to be reduced by as much as 58 percent.

There are risks associated with the use of prescribed fire. Escaped prescribed fire may cause unintended resource and economic damage. However, these occurrences are extremely rare relative to the large number of prescribed fires that are successfully conducted (Russell et al. 2004). Implementing prescribed fire when climatic and fuel variables are considered optimal for the desired fire behavior increases the likelihood of successfully meeting objectives and reduces the risk of unintended resource damage from escaped prescribed fire.

Indirect Effects

The beneficial effects of prescribed fire on altering fuel structure and future wildfire behavior and effects have long been observed and reported (Vaillant et al. 2006, Stratton 2004 and Finney 2001). The proposed treatments were designed to optimize the effectiveness of future fire suppression efforts and to reduce the impacts of future fires on natural resources and the public.

The severity of fire effects and difficulty of fire suppression in future fires are primarily associated with the total amount of fuel available (Skinner 2002) and environmental hazards to firefighters. As noted above, either action alternative would reduce current total fuel loads by as much as 68 percent and large diameter fuels by as much as 58 percent in the treated areas. Reducing the large diameter fuels that have accumulated in the wake of recent wildfires would greatly reduce both the likelihood of crown fire and predicted fire line intensities (refer to the vegetation effects section below for predicted vegetation severity effects from the action alternatives).

Modeling using FlamMap indicates that up to an 80 percent reduction in the potential for active crown fire in the treated areas would result from implementation of either action alternative. With these reductions, resistance to control and the associated suppression efforts to control a fire is also reduced. Within the treated areas, challenges to future fire suppression operations would therefore be reduced through the consumption of large diameter fuels, snags and ladder fuels that contribute to higher resistance to control.

Modeling also shows a slight increase in burn probability (5 to 10 percent) related to the proposed treatments in both action alternatives. This is due to a trending of the fire environment to a more historically accurate landscape dominated by lighter fuel loading and less canopy density, which would allow for moderately increased rate of spread through lighter fuels carried by wind. Post-implementation fuel loading would be characterized by smaller diameter fuels, and the overall fuel loading would be significantly lower. Suppression efforts under these conditions are more likely to be successful, even with increased spread rates, due to increased line production rates and decreased resistance to control, fire line intensity and predicted flame lengths.

Cumulative Effects

Under either action alternative, future wildfires would play a role more similar to that of historic conditions than under current conditions. Future fires within the project area would exhibit reduced fire behavior and intensity, resulting vegetation burn severity and resistance to control in areas where treatment has occurred. Conducting prescribed fire operations as proposed would begin the restoration of fire to the ecosystem in a more controlled manner, thus expediting a return to the historic fire regime and reducing impacts on resources and the public from wildfires through a gradual reduction in accumulated fuels. Additional benefits would accrue considering ongoing and foreseeable actions, as described below.

- Implementation of either action alternative would moderate fire behavior within the project area and reduce the risk that a wildfire originating in the project area would threaten adjacent public and private lands. Either action alternative would reduce the risk that a wildfire would encroach into the project area from adjacent public or private lands.
- While fire suppression in the Trinity Alps Wilderness would continue in accordance with Forest policy and direction, the predicted improved fuel conditions would promote more self-regulated fire behavior, thereby reducing suppression costs and risks to firefighters and the public.

In summary, both action alternatives would have beneficial effects on fire and fuels management by trending the landscape toward historic fuel conditions. Implementation of either action alternative would provide a safer environment for firefighters and reduce the adverse effects to natural resources and the public from future wildfires.

With reduced fire behavior conditions in strategic locations future fires would be more manageable, with a suite of options available to fire managers to limit fire size and reduce suppression costs and risks to firefighters. Managing fuels in the project area through prescribed fire as proposed may facilitate future management of wildfires within the Trinity Alps Wilderness for resource benefits.

Vegetation

Existing Condition Vegetation in the Project Area

Vegetation in the Trinity Alps project area is comprised primarily of tree-dominated stands – both conifer and hardwood. Tree-dominated[18] stands account for approximately 50,406 acres, or 86 percent of the project area.

Conifer and hardwood species present in the project area include:[19]

Douglas-fir (*Pseudotsuga menziesii*)	white fir (*Abies concolor*)
sugar pine (*Pinus lambertiana*)	Jeffrey pine (*Pinus jeffreyi*)

[18] A tree-dominated classification indicates that the stand historically has supported and is capable of growing trees.
[19] While Port Orford cedar (*Chamaecyparis lawsoniana*) is found within the Trinity Alps Wilderness, no known sites exist within the project area. Therefore, a Port Orford cedar risk analysis is not required (Forest Plan, p. 4-18).

red fir (*Abies magnifica*)
incense cedar (*Calocedrus decurrens*)
canyon live oak (*Quercus chrysolepis*)
Pacific madrone (*Arbutus menziesii*)
tree chinquapin (*Chrysolepis chrysophylla*)
California bay (*Umbellularia californica*)
ponderosa pine (*Pinus ponderosa*)
California black oak (*Quercus kelloggii*)
bigleaf maple (*Acer macrophyllum*)
alder species (*Alnus* spp.)
knobcone pine(*Pinus attenuata*

Understory vegetation in the conifer stands consists of shrubs, perennial and annual forbs and grasses.

Regional dominance types accounting for greater than ten percent (5,835 acres) of the project area are considered 'major' for the purposes of this report. These include only three regional dominance types and they are described below:

- The Pacific Douglas-Fir Alliance accounts for approximately 27,607 acres, or 46 percent of the project area.
- The Douglas-Fir - White fir Alliance accounts for another 8,653 acres, or 15 percent of the project area.
- The White Fir Alliance takes in another 7,642 acres, or 13 percent of the project area.

These three major regional dominance types comprise approximately 74 percent of the project area. From this it can be concluded that the project area is primarily a forested habitat. See the Vegetation Report in the project record for a detailed description of regional dominance types in the project area.

Vegetation Fire Severity

Vegetation fire severity acres from recent wildland fires within the project area are considered to predict the likely behavior of prescribed fires and of future wildland fires under each alternative. These recent wildfires occurred during the wildland fire season, which is the time of year when fires are anticipated to burn with the most detrimental overall resource effects. Resource effects to vegetation are interpolated from wildland fire effects. Model predictions for prescribed fire purposes were also utilized to understand wildland fire effects to vegetation.

Iron Alps Complex

On June 21, 2008 the Carey Fire was reported; this fire would later be managed as part of the larger Iron Alps Complex. The Carey Fire burned approximately 3,708 acres in the central and western portions of the project area (see Figure F.4 in Appendix F). The results of RVAG analysis from this fire are summarized in Table 3.2 below.

Table 3.12. Iron Alps Complex vegetation fire severity by alliance category within the Trinity Alps Wilderness Prescribed Fire Project area*.

Alliance category	Unchanged Acres	Low severity acres	Moderate severity acres	High severity acres	Total acres	Percentage of burned area
Conifer Forest/Woodland	1,562	1,018	478	340	3,399	88%
Hardwood Forest/Woodland	118	61	31	20	230	6%
Shrub and chaparral	64	63	47	29	204	5%
Herbaceous	22	12	6	4	41	<1%
All Alliances	1,766	1,154	562	393	3,874	100%
Percentage by severity class	**45%**	**30%**	**15%**	**10%**	**100%**	

*The severity data were remotely sensed, using the RVAG process. Acreage differences between the RVAG data and fire perimeter GIS acreage are due to differences in the way data are obtained, and polygon acres versus raster data acres.

Backbone Fire

On July 1, 2009 as a weather pattern with significant lightning moved across northern California, three individual fires – the Redspot, Trinity and LT-17 fires – were ignited within the project area. These fires would later be managed as part of the greater Backbone Complex. The three fires together consumed a reported total of 4,898 acres. Acres consumed were entirely within the perimeter of the 1999 Megram Fire, which was a large, severe wildland fire. See Table 3.13 below.

Table 3.13. Backbone Fire vegetation fire severity by alliance category within the Trinity Alps Prescribed Fire Project area*.

Alliance category	Unchanged Acres	Low severity acres	Moderate severity acres	High severity acres	Total acres	Percentage of burned area
Conifer Forest/Woodland	1,443	794	732	1,679	4,647	94%
Hardwood Forest/Woodland	29	7	4	5	45	<1%
Shrub and chaparral	102	32	22	101	257	5%
Herbaceous	Severity unclassified due to limited acres affected				1	<.1%
All Alliances	1,766	1,154	562	393	3,874	100%
Percentage by severity class	**32%**	**17%**	**15%**	**36%**	**100%**	

*The severity data were remotely sensed, using the RVAG process. Acreage differences between the RVAG data and fire perimeter GIS acreage are due to differences in the way data are obtained, and polygon acres versus raster data acres.

GIS analysis of existing vegetation fire severity layers for the Megram and Backbone fires reveals that approximately 1,208 acres that burned at high severity during the Megram Fire re-burned in the Backbone Fire ten years later. The data indicate that the Backbone Fire burned at higher intensities and produced higher vegetation fire severity in areas that burned at high intensity during the Megram Fire.

Review of the above tables reveals that vegetation fire severity effects in the moderate and high categories were greater in the Backbone Fire than in the Iron-Alps Complex.

River Complex

In July of 2015, multiple natural ignitions grew together to form the River Complex, which eventually would burn 6,055 acres into the project area, including 2,285 acres identified for treatment under both alternatives. RAVG analysis from this fire was conducted, and the results are summarized below.

Table 3.14. Acres within each severity class within the project area and within proposed treatment areas.

Severity Class	Within project area (acres)	Within treatment areas (acres)
Unchanged	2,938	1,034
Low	1,333	599
Moderate	715	302
High	1,070	350

Environmental Consequences

Analysis Methodology

Assumptions

The No Action alternative assumes wildland fire under uncontrolled conditions. Under no action, effects to vegetation were discussed assuming that a future wildland fire would occur during the May-October fire season typical for the area. Under the action alternatives, it was assumed that prescribed fire would be ignited when predicted weather and fuel moisture would be conducive to mostly low-intensity fire to minimize moderate- and high-severity vegetation effects.

Vegetation fire severity from recent wildfires (Megram Fire, Iron Alps Complex and the Backbone Fire) was analyzed to compare the potential effects of the alternatives with regard to vegetation fire severity in a future wildfire. The vegetation fire severities resulting from these recent fires provide a context for comparing predicted severities from no action to prescribed fire as proposed under the action alternatives.

Alternative 1

Direct and Indirect Effects

Under Alternative 1 no direct effects to vegetation would occur, since current management activities would not change.

Indirectly, the percentages of vegetation fire severity displayed in Table 3.14 below could be anticipated for the landscape effects of a future wildland fire, provided the fire is not contained. These percentages were applied to display the predicted landscape level

effects of an unplanned ignition across the project area. The likelihood of a wildland fire is assessed by risk over time. Approximately 49,130 acres[20] (84 percent) of the project area burned in the Megram Fire. Vegetation fire severity for the Megram Fire within the project area is summarized in Table 3.15 below.

Table 3.15. Vegetation fire severity resulting from the Megram Fire*

Vegetation Fire Severity Class	Acres	Percentage of project area
Unchanged	10,620	22%
Low	19,051	39%
Moderate	8,674	18%
High	10,785	22%
Total	49,130	100%

* Vegetation fire severity data from the Shasta Trinity National Forest GIS library, pre RVAG.

The Megram fire is significant in understanding landscape level effects as a result of future unplanned ignitions that are likely to result in wildland fires. If an unplanned ignition occurs during fire season, which is typically May through October, the resistance to control is likely to be increased by the high level of available fuels resulting from the Megram Fire.

Previous wildland fires within the project area have the potential to contribute significant fuels as a result of low, moderate and high vegetation fire severity effects. It is unknown exactly when or how a wildland fire will occur, but if one does occur in the project area, effects as displayed above in Table 3.15 for the Megram Fire, or below in Table 3.16 below for the Backbone Fire, would be anticipated with implementation of no action.

Table 3.16. Predicted vegetation fire severity under the No Action alternative in the event of an unplanned ignition*.

Vegetation Fire Severity Classes	Acres within the project area likely to be affected	Percentage of the project area likely to be affected
Unchanged	22,172	38%
Low	13,420	23%
Moderate	8,752	15%
High	15,754	27%

*Acres are derived from vegetation fire severity percentages within the project area during the recent Backbone Fire.

The numbers represented above are anecdotal, as the true effects of a wildland fire are unknown until it occurs. Location and timing of ignition and seasonality affect the severity effects to vegetation during fires. With the predominant vegetation type in the project area being forested, and predominant acres affected during recent wildland fires being forested, the effects of a future wildfire across the landscape can be assumed to be similar to those of the previous individual fires if the proposed fuels treatments are not implemented.

[20] From 2011 FRAP GIS data (see the project record).

Cumulative Effects

Cumulatively, Alternative 1 would likely result in higher vegetation fire severities in the event of a future wildland fire. This would be expected due to continued fuels accumulation and increasing vegetation densities over time.

Dynamic forested ecosystems are disturbance-dependent, and past wildland fire suppression policies have removed the major disturbance regime – frequent, mixed-intensity fires – that were once common to the project area. A course of no action, in combination with ongoing fire suppression, would continue the trend away from historical fire frequency, intensity and vegetation fire severities.

Alternative 2 – Proposed Action

Direct Effects

Table 3.17 below displays the maximum predicted vegetation fire severities within the proposed treatment areas from prescribed fire under Alternative 2. The vegetation fire severity percentages are derived from vegetation fire severities from the recent Iron-Alps Complex. These percentages are likely within the range of historic norms for all severity levels and display what would be considered a mixed-severity fire. It should be noted that the Iron-Alps Complex burned under weather and fuels conditions of between the 60th and 90th percentiles[21] over several months. Prescribed fires under controlled conditions (i.e. under conditions between the 30th to 60th percentiles) are likely to burn at somewhat lower intensities, with a lower percentage of resulting high vegetation fire severity. High-severity vegetation effects may occur in a few small, isolated patches.

Table 3.17. Predicted vegetation fire severities from prescribed fire in proposed treatment areas under Alternative 2*

Vegetation Fire Severity Classes	Acres within the treatment areas likely to be affected	Severity percentage applied to each severity class**
Unchanged	7,519	45%
Low	5,012	30%
Moderate	2,506	15%
High*	1,670	10%

* These acres are different than predicted fire behavior under the same alternative from the fire/fuels affects section, because the fire/fuels effects are categorized by burn probability, flame length and crown fire potential, while the vegetation effects discusses affects to vegetation fire severity classes.

**Vegetation fire severity percentages are derived from the recent Iron-Alps Complex, which burned during fuel and weather conditions of between the 60th and 90th percentiles. Actual high vegetation fire severities resulting from prescribed fire under 30th to 60th percentile conditions would likely be less than 10 percent.

Alternative 3 – Additional Treatment Acres

Direct Effects

Table 3.18 below displays the maximum predicted vegetation fire severities from prescribed fire within the proposed treatment areas under Alternative 3. As with

[21] see Appendix A - Glossary

Alternative 2, prescribed fires under controlled conditions are likely to burn at somewhat lower intensities, with a lower percentage of resulting high vegetation fire severity.

Table 3.18. Predicted vegetation fire severities from prescribed fire in proposed treatment areas under Alternative 3.

Vegetation Fire Severity Classes	Acres within the treatment areas likely to be affected	Severity percentage applied to each severity class*
Unchanged	8,589	45%
Low	5,726	30%
Moderate	2,863	15%
High*	1,908	10%

*Vegetation fire severity percentages are derived from the recent Iron-Alps Complex, which burned during fuel and weather conditions of between the 60th and 90th percentiles. Actual high vegetation fire severities resulting from prescribed fire under 30th to 60th percentile conditions would likely be less than 10 percent.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Conifer Forest/Woodland category acres would receive the most prescribed fire treatment under both action alternatives, as this category of vegetation encompasses most of the project area. The overall effects to stand structure would vary depending on existing conditions and intensity of burn. The suppressed and/or intermediate cohort of the stand are most likely to experience some degree of mortality due to the presence of foliage within flame length of the ground (ladder fuels), increasing the number of small diameter snags within the stand (which will eventually contribute to surface fuels in three to ten years). While most of the codominant/dominant trees and mature stand characteristics would remain intact, small pockets of mortality can be expected as fire occasionally moves into the crown, resulting in a mosaic of structural diversity across the landscape.

Most hardwood tree and shrub species found in the project area would be expected to resprout (via the root crown, lignotubers, rhizomes, or stump-sprouting) following a low- to moderate-severity fire. Due to the small percentage of the project area modeled for high-severity patches (see Tables 3.17 and 3.18 above with the comments for high vegetation fire severity), it is likely that direct negative effects (e.g., basal area mortality) would be minor and direct positive effects (e.g., seed scarification) would be moderate.

Indirectly, because reducing fuels through prescribed fire would provide less combustible material (both surface and ladder fuels) to carry a future wildfire, either action alternative would be expected to moderate vegetation fire severities in future wildland fire events in the areas treated. In addition, prescribed fire placed strategically on the landscape, as designed under both action alternatives, may modify future fire behavior and moderate vegetation fire severities in portions of the project area not treated (see the Fire and Fuels section).

Cumulative Effects

The cumulative effects under both action alternatives are anticipated to include a trend to historical vegetation fire severities in the project area, with a decrease in high- and moderate-severity effects from what has occurred in recent fires, given that current fire

management policies in the Trinity Alps Wilderness are likely to continue. No adverse cumulative effects to vegetation are anticipated from implementation of either action alternative.

Botany

Introduction

This section summarizes the effects to plant, lichen, and fungi species of concern within the project area. See the project Biological Evaluation in the project record for a more detailed analysis of Threatened, Endangered, Sensitive, Endemic, Watch List, Survey and Manage species, and noxious weeds.

Element occurrences of and potential suitable habitat for species occurring in the project area were assessed using Natural Resources Information Systems (NRIS) and California Natural Diversity Database (CNDDB) Element Occurrence Records, the California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California, current peer-reviewed literature, and personal communication with Shasta-Trinity National Forest botanical personnel. Queries were performed utilizing soils, elevation, and 2007 Existing Vegetation Geographic Information System (GIS) layers to assess potential suitable habitat for "guilds" or groupings of species with similar habitat requirements in the project area. In general, fire line intensity data were used to estimate direct effects and crown fire potential data was used to estimate indirect effects to habitat guilds; however, both layers were used for cumulative effects analysis. The following describes vegetation severity definitions:

- **Unchanged:** One year post-fire the burned area is indistinguishable from pre-fire conditions. This does not always indicate that the area did not burn.
- **Low:** Areas of surface fire with little change in cover and 10-25% mortality of the structurally dominant vegetation.
- **Moderate:** There is a mixture of effects (low to high) on the structurally dominant vegetation and mortality 26-75%.
- **High:** Areas where the dominant vegetation has greater than 75% mortality.

Cumulative Effects

The general temporal boundary for past actions is 100 years and reasonably foreseeable future actions limited to the next 20 years. The 20-year time period reflects the general boundary for the effectiveness of fuels treatments. General points, however, (e.g. successional trajectories) may be discussed for a period of 80 years for botanical species requiring late-successional habitats for survival. The cumulative effects analysis considers the project boundary (approximately 58,349 acres) as the furthest extent of effects in the modeling of all alternatives. The project boundary was chosen as the analysis area because this boundary provides the most comprehensive display of effects to vegetation conditions from implementation of the action alternatives and contains a large enough area to capture features that may influence healthy vascular plant, lichen, bryophyte, or fungi populations.

Endangered and Threatened

There are no federally listed Endangered or Threatened plants known to occur on the Shasta-Trinity National Forest. On July 18, 2011, Whitebark pine (*Pinus albicaulis*) was designated as a candidate for federal listing by the U.S. Fish & Wildlife Service and has been added to Forest Sensitive species list.

Existing Condition Habitat Guilds

Habitat guilds are generalizations of habitat and reflect the grouping where species are discussed. Table 3.19 below displays four habitat guilds identified within the project area. Although other vegetation types occur within the project area, these habitat guilds represent the major vegetation types in which botanical species are likely to occur.

Table 3.19. Habitat guilds within the Trinity Alps Wilderness Prescribed Fire Project area.

Guild/Habitat Type	Acres in Project Area	Alternative 2 Treatment Acres	Alternative 3 Treatment Acres
Serpentine (ultramafic soil)	3,979	1,177	1,289
Rocky Outcrops	38,006	10,624	12,184
Late-successional coniferous forest	18,868	4,944	5,620
Riparian/Wet Meadow	115	19	45

Sensitive Species

Recent botanical surveys have not taken place; thus, suitable habitat (i.e. potential presence of species) was used in this analysis to determine potential effects from the no action or action alternatives. Table 3.20 below displays Forest Sensitive plant, lichen, and fungi species that could potentially occur in the project area based on the presence of suitable habitat.

Table 3.20. Potential Forest Sensitive Species within the Trinity Alps Wilderness Prescribed Fire Project area.

Scientific Name	Life Form	Habitat	Guild(s)
Anisocarpus scabridus (=Raillardiopsis scabrida)	vascular plant	rocky, open subalpine slopes	Rocky outcrops
Botrychium subg. Botrychium and subg. *Osmundopteris*	vascular plant	conifer forest and wet meadow edges	Late-successional coniferous forest/Riparian or Wet meadow
Campanula wilkinsiana	vascular plant	streambanks in red fir and subalpine forest	Riparian or Wet meadow
**Chaenactis suffrutescens*	vascular plant	rocky slopes on ultramafic soils	Serpentine/Rocky outcrops

Scientific Name	Life Form	Habitat	Guild(s)
Cypripedium fasciculatum	vascular plant	mixed conifer forest	Late-successional coniferous forest
Cypripedium montanum	vascular plant	mixed conifer forest	**Late-successional coniferous forest
Epilobium oreganum	vascular plant	stream banks, meadows, bogs, ultramafic soils	Serpentine/Riparian or Wet meadow
Eriogonum ursinum var. *erubescens*	vascular plant	rocky open ridgelines	Rocky outcrops
Iliamna latibracteata	vascular plant	coniferous forest and streamsides	**Riparian or Wet Meadow
Ivesia pickeringii	vascular plant	ephemeral drainages in mixed conifer forest, ultramafic soils	**Serpentine
Lewisia kelloggii ssp. *hutchisonii*	vascular plant	Decomposed granite, slate, volcanic rubble, in upper montane and subalpine conifer forest openings	Rocky Outcrops
Parnassia fimbriata var. *intermedia*	vascular plant	wet areas, lake edges in ultramafic soils	Serpentine/Riparian or Wet meadow
Penstemon tracyi	vascular plant	rocky outcrops at higher elevations (6500-7250 feet)	Rocky Outcrops
Pinus albicaulis	vascular plant	dry, rocky mountainsides; subalpine and alpine zones	Rocky Outcrops/Late-successional coniferous forest
Raillardella pringlei	vascular plant	stream banks, meadows, bogs, ultramafic soils	Serpentine/Riparian or Wet meadow
Sedum paradisum	vascular plant	rocky outcrops in forest openings	**Rocky outcrops
Streptanthus oblanceolatus	vascular plant	Steep metavolcanic bluffs	Rocky Outcrops
Buxbaumia viridis	bryophyte	perennial riparian habitat in conifer forest	Late-successional coniferous forest/Riparian or Wet meadow
Peltigera gowardii	lichen	perennial cold water streams	Riparian or Wet meadow

Scientific Name	Life Form	Habitat	Guild(s)
Sulcaria badia	lichen	Open white oak grasslands or mature Douglas-fir forest with black oak component	Late-successional coniferous forest
Dendrocollybia racemosa	fungus	organic leaf matter in mature conifer forest	Late-successional coniferous forest
Phaecollybia olivacea	fungus	mixed conifer forest containing oak or pine	Late-successional coniferous forest
Cudonia monticola	fungus	mature conifer forest	Late-successional coniferous forest
Boletus pulcherrimus	fungus	mature or late-seral Douglas-fir forest with hardwoods	Late successional coniferous forest

*populations identified in project area.
**species found primarily within, but not limited to, this guild.
Based on the 2013 R5 Sensitive Species List (USDA Forest Service 2013b)

Forest Plan Endemic Species

There is no suitable habitat for any Forest Plan Endemic species within the project area.

Watchlist Species

There is one watchlist species identified for this project, *Smilax jamesii* (English Peak greenbriar).

Survey and Manage Species

This project falls under the one of four Pechman exemptions for actives that can proceed and do not require surveys or site management. Projects that involve hazardous fuel treatments where prescribed fire is applied do not require predisturbance or project level surveys. The proposed activities of maintaining trails and firelines along with aerial ignitions into the project area qualify for using this exemption. There are no known sites in the project area and no analysis requirement.

Environmental Consequences

All Botanical Species
Alternative 1 - No Action

Direct and Indirect Effects

No direct effects to Sensitive or Watch List plants, lichens, or fungi would occur under the No Action alternative. The Trinity Alps Prescribed Fire project area is identified as being within a high wildfire risk area based on factors such as lightning starts, presence

of human activity, and presence of a hazardous fuels condition (see project Fire, Fuels, Air Quality and Vegetation report). If no treatment occurs the current stand densities that have higher fuel loadings and higher fire hazard would still remain. Not implementing an action alternative could increase the possibility of the project area experiencing high-severity wildfire, which could result in adverse impacts to several Sensitive species in the project area.

The burning of aboveground reproductive structures or lethal soil temperatures that can kill underground reproductive structures and may directly cause adverse impacts to plant species. Indirectly, severe modifications in the forest canopy from crown fire could be large enough to eliminate or reduce necessary habitat characteristics, such as shade, critical for native and rare species' survival.

Implementation of the No Action alternative would result in no increase in suitable habitat for noxious weeds from project related activities. Other factors that contribute to introduction and establishment of weeds (recreational use of trails, transport of invasive seeds on stock/pack animals and potential wildfires) would continue.

Cumulative Effects

The No Action alternative, when combined with the effects of previous fire suppression management, associated high fuel loads, and increased fire ignitions from ongoing activities (e.g. hiking, hunting, stock use) in the project area would increase the risk of stand-replacing fire. The result would be a short-term moderate adverse direct effect of the burning of reproductive structures of plants, and a long-term moderate, adverse indirect effect of the removal of suitable habitat (e.g. removal of overstory canopy, accumulation of downed fuels).

The existing condition modeling shows approximately 42 percent of the project area has the potential for high or moderate-severity effects to vegetation in the event of an unplanned wildfire (see project Fire, Fuels, Air Quality and Vegetation report). This data imply, along with the high number of lightning strikes in the area, that there will be a wildfire event in the project area again, and, if fuels are left untreated, the result would be a moderate amount of vegetation severity and/or creation of new habitat for invasive plants. A high-severity wildfire event could also create favorable conditions (e.g. open canopy, decreased number of native species for resource competition) for noxious weed invasion. A noxious weed invasion would have the potential to displace native species and the broader native plant communities including Sensitive and Watch List species populations.

Sensitive Species

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Serpentine Habitat Guild

Approximately 1,177 and 1,289 acres (alternatives 2 and 3 respectfully) of serpentine or ultramafic soils are present. Of that, approximately 3 percent in alternative 2, and 4 percent in alternative 3is projected to have moderate to high fire line intensity. The

remaining 95 and 96 percent (by alternative 2 and 3 respectfully) is typed as low intensity fire only. There are no acres projected for active crown fire. The potential direct effects to serpentine-associated species would be minor and short term due to the small percentage of affected area. This treatment could result in somewhat reduced available soil moisture from reductions in canopy closure, which may have moderately adverse indirect effects for certain species.

Rocky Outcrop Habitat Guild

Approximately 10,624 and 12,184 acres (alternatives 2 and 3 respectfully) of rocky outcrop habitat guild are present within the treatment areas. In both alternatives, approximately 99 percent of the habitat is modeled for low fire line intensity, with the remaining one percent as moderate to high. Active crown fire accounts for less than one percent of the affected area.

Direct adverse effects to species in this guild would be negligible to minor and short term due to the small percentage of moderate/high intensity output, the presence of other vegetation necessary to carry fire (within the immediate surroundings of the Sensitive plants) would likely be limited in abundance or absent and, the season of treatment implementation.

Late Successional Forest Habitat Guild

There are approximately 4,944 and 5,620 acres (alternatives 2 and 3 respectfully) of late-successional habitat within the treatment areas. Of the suitable acres within the treatment areas for both alternatives, less than one percent of the area is modeled for moderate to high fire line intensity. Ninety-nine percent of the area is modeled to result in low fire line intensity. No active crown fire is modeled for this habitat type. Potential adverse direct effects to late-successional-associated species would be minor due to due to the small percentage of moderate/high intensity output for this habitat as well as season of treatment implementation.

There would be a minor adverse effect on a microsite basis where overstory canopy is removed, reducing shade or soil moisture needed for these species. Implementation of the action alternatives would result in a moderate indirect beneficial effect to late-successional species due to a reduction in competing understory vegetation.

Riparian/Wet Meadow Habitat Guild

Approximately 19 and 45 acres (alternative 2and 3 respectfully) have suitable habitat for this habitat guild. Less than one acre of riparian habitat is modeled for high fire line intensity (in either alternative) and only two acres are modeled for moderate fire line intensity (in Alternative 3 areas only). Treatment of the fuels would indirectly benefit this guild since there would be a reduced likelihood of high vegetation severity and a loss of the vegetation that stabilizes soils, in the event of wildland fire.

Cumulative Effects

Serpentine Habitat Guild

Of the 3,979 acres of possible serpentine substrate within the entire project area, approximately 12 percent of this type is currently non-stocked (i.e. experienced high vegetation severity from past events). This loss of potential habitat, combined with

minor potential indirect effects from passive crown fire, as well as minor potential direct effects from moderate/high fire line intensity lead to a possibility of moderate adverse cumulative effects to serpentine-associated species.

Rocky Outcrop Habitat Guild

Of the 38,006 acres of possible coniferous habitat in the entire project area that may have openings for species associated with this habitat guild, 33 percent is currently labeled as non-stocked from past fire events. As noted previously, 58 percent of this habitat type is modeled for surface fire, 42 percent is modeled as passive crown fire and 99 percent is modeled for low fire line intensity. The expected direct and indirect effects, combined with past and future actions would result in a minor adverse effect to these species.

Late Successional Forest Habitat Guild

Approximately 18,868 acres of late-successional coniferous forest occurs in the entire project area. It is difficult to assess vegetation severity measures resulting from past fires due to a lack of information regarding previous cover/density and tree sizes. If approximately 23 percent of the project area is labeled as non-stocked, we can infer that an additional 5,660 acres of late-successional habitat may have occurred previous to recent fires. The predicted fire line intensity from alternatives 2 or 3, combined with presumed past loss of habitat, result in a minor adverse effect to these species.

Riparian/Wet Meadow Habitat Guild

There are approximately 115 acres of perennial riparian-related vegetation types modeled within the entire project area. A total of 61 of these acres (53 percent) are modeled as non-stocked from previous fires. Less than one acre (in either alternative) is modeled for passive crown fire or high fire line intensity, and two acres are modeled for moderate fire line intensity. Although the effects to this habitat were major from past fire events, the two action alternatives would, in combination, only minimally increase the potential for adverse effects to these species.

Sensitive Fungi Species
Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Fungi would likely be present above ground during periods where treatments could occur, (from September 16th to February 1st) increasing potential impacts to fungal fruiting bodies. In areas of high severity burns, the below soil layers would be altered and could impact below ground mycorrhizal networks. As noted previously, less than one percent of suitable habitat acres within the late-successional habitat treatment areas are modeled for high fireline intensity and approximately one percent is modeled for moderate fireline intensity from prescribed burn. No active crown fire is modeled for this habitat type, thus potential effects to fungi species and their suitable habitat would be minor and short term.

Cumulative Effects

It is difficult to determine the most important factor that influences healthy fungi populations. Influences include a diverse underground fungal community for purposes of

regeneration and recovery from environmental impacts, aboveground species diversity to provide multiple host species and organic matter inputs, and adequate soil moisture for fungi growth and regeneration as well as terrestrial species growth and organic matter contribution. Past actions (wildfires) have contributed to modification or loss of a possible 5,660 acres of the suitable habitat within the project area. Either action alternative would contribute to negative impacts to an additional 30 acres of available habitat. In relation to the total amount of past and present suitable habitat for Sensitive fungi, the action alternatives would contribute less than one percent of additional impacts to habitat for branched collybia, olive phaeocollybia, mountain-loving cudonia and red-pored bolete. This incremental increase is not sufficient to threaten the viability of the three species or lead any of the species to a trend toward federal listing.

Determination

Implementation of either action alternative may impact individuals but would not likely lead to a trend toward Federal listing or loss of viability for any Sensitive species. This determination is based on the following:

- A very low percent of the proposed treatment areas (approximately one percent) is modeled for high-intensity fire or active crown fire. Therefore, it is likely that only a negligible amount of suitable habitat for Sensitive botanical species would be degraded or downgraded.
- Long-term moderate direct and indirect beneficial effects are expected from the treatments as long-term population viability is enhanced, and plants and habitat are protected from uncharacteristically extreme wildfire behavior.
- With the expected trend toward a historic fire regime, the forest would become more fire-resilient and fire could resume more of a natural role in the ecosystem.
- Seasonal burning restrictions will help protect vascular plant species reproduction cycles or fecundity, which typically occurs during the no burn restriction from February 1 through September 15.

Watchlist Species
Effects Common to Alternatives 2 and 3

Direct, Indirect and Cumulative Effects

English Peak greenbriar is a vining perennial that occupies moist riparian areas including lakesides, stream banks, alder thickets, and wet slopes in montane forest. Direct, indirect and cumulative effects for this Watchlist species are the same as to the Riparian/Wet Meadow Habitat guild described above.

Noxious Weeds
Effects Common to Alternatives 2 and 3
Direct and Indirect Effects

Noxious weed habitat can be created when competing vegetation is removed and bare soil is exposed, thus accelerating water loss. There are no ground disturbing (i.e. turning

up of soil) activities proposed under either action alternative. Prescribed fire, however, would remove vegetation within the project area, creating newly exposed areas for possible infestation or expansion of noxious weeds. The high fire line intensity areas within proposed treatment areas (less than 1% of treatment acres) would increase habitat for noxious weeds. Additionally, areas with high-intensity fire would create localized areas of soil sterilization that can be difficult for native species to recover from.

Cumulative Effects

Portions of the project area that have the highest likelihood of weed presence include existing fire lines constructed during past fire events (e.g. Iron Alps Complex fire), hiking trails, camps, and areas closest to roads outside of the project area (i.e. the southern portion near the town of Denny). Past actions such as wildfires, hydraulic mining, dredging, and hard rock mining along most riparian channels throughout the 20th century caused ground-disturbance and removal of topsoil within the analysis area (USDA, 2000). These past activities, along with more recent wildfires have created areas where non-native species may proliferate. Current actions that may impact noxious weed populations includes trail maintenance (e.g. removal of brush or logs); however, these activities allow for identification – and possible removal– of these species as a result of Forest personnel presence.

Several project design features have been incorporated to minimize impacts to natural resources within the project area (see Chapter 2). With the implementation of design features the likelihood of invasion by noxious weeds would be minimized.

Wildlife

Introduction

This section summarizes the analysis of project effects to wildlife species of concern in the project area. See the project Biological Evaluation / Assessment and Wildlife Report in the project record for a detailed analysis of Threatened, Endangered and Sensitive wildlife species, Management Indicator Assemblages, Survey and Manage species and migratory birds.

Federally Listed Species / Critical Habitats

Of the terrestrial wildlife species and/or Critical Habitats listed as Threatened, Endangered or Proposed within the five USGS quadrangle maps that encompass the project area, only the Threatened northern spotted owl and its Critical Habitat would be potentially affected by project activities.

Revised Critical Habitat for the northern spotted owl was designated by the US Fish and Wildlife Service on November 21, 2012. The project area is not within designated NSO Critical Habitat.

Federal Proposed Species for listing under the Endangered Species Act

The Pacific fisher has been proposed for listing under the Endangered Species Act. Currently, the US Fish and Wildlife Service (USFWS) has not proposed critical habitat for the Pacific fisher, so impacts to critical habitat for the Pacific fisher cannot be

addressed. The Pacific Fisher is a Forest Service Sensitive Species and potential project effects were analyzed in the Wildlife Biological Evaluation (BE) for this project.

Forest Service Sensitive Species

The following Region 5 Forest Service Sensitive Species (USDA Forest Service 2013b) were addressed based on the occurrence of the project area within the species' range, the presence of suitable habitat within the analysis area and/or project area, and current or historical documentation of a species within or near the project area:

Pacific fisher	American marten	California wolverine
northern goshawk	northwestern pond turtle*	southern torrent salamander*
Cascade frog*	Pressley Hesperian snail*	western bumble bee
fringed myotis	Western red bat*	

*Riparian associated species

Survey and Manage Species

The activities proposed in the Trinity Alps wilderness Prescribed Fire Project fall under the following Survey and Manage exemption from the October 11, 2006 modified injunction order in *Northwest Ecosystem Alliance v. Rey (Case 2:04-cv-00844-MJP, Doc. No. 109):* the portions of projects involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging will remain subject to survey and manage requirements except for thinning of stands younger than 80 years old. Therefore, the Survey and Manage provisions of the Northwest Forest Plan do not apply to this project. Even though managing known sites is not required for this project, there are no known sites occupied by Survey and Manage wildlife species within or near any of the areas proposed for treatment.

Existing Condition Northern Spotted Owl (NSO)

NSO Populations in the Project Area

Nine NSO pairs and two single individuals have been documented within the analysis area since 1971; activity centers were established by the STNF for the nine pairs' locations, though not for the single individuals. Since the initial discovery, the area has burned multiple times (including the Megram fire in 1999, the Bake-Oven fire in 2006, the Iron Complex in 2008 and the Backbone fire in 2009 – which burned with varying intensities through all of the detection areas). It is unknown whether any of the nests were affected during these fires, but many of the stands that supported these historical nest sites burned with high intensity.

Many of the historic activity centers that sustained high-severity fire impacts within core areas are now characterized as non-stocked or zero canopy closure[22] in portions of the home range, while other areas still contain patches of suitable habitat. Progeny of these territories still in the project area have most likely relocated to habitat within the analysis area that sustained less severe fire behavior and where stands of late successional habitat remain.

[22] Information derived from the 2007 Forest EVEG database.

Suitable NSO Habitat in the Project Area

Suitable NSO habitat is scattered throughout the analysis area; the quality and overall suitability for nesting/roosting and foraging varies with abiotic features such as topography, slope, aspect and distance to water, and severity of the last wildfire to burn in the area.

Table 3.21. Suitable NSO habitat within the project area.

Type of NSO Habitat	Acres in Project Area	Percent of Project Area
Nesting/Roosting	18,868	32
Foraging*	8,043	14

*Foraging habitat is additive and includes nesting/roosting habitat with the additional 8, 043 acres of habitat with smaller size class of tree (>12"dbh) and reduced canopy cover (>40%).

Table 3.22. Suitable NSO habitat within the treatment areas under the action alternatives and relative to the amount of suitable habitat within the project area.

Type of NSO Habitat	Acres in Treatment Areas		Percent of NSO Habitat within the Project Area (%)	
	Alt 2	Alt 3	Alt 2	Alt 3
Nesting/Roosting	5,620	6,465	30	34
Foraging	3,249	3,973	40	49

NSO Prey Species

Composition of prey in NSO diet varies likely in response to prey availability. Northern flying squirrels (*Glaucomys sabrinus*) and woodrats (*Neotoma* spp.) are usually the predominant prey both in biomass and frequency, with woodrats generally the dominant prey item in the drier forests typically found in the southern portion of the NSO range. Habitat for flying squirrels is present in the analysis area, and field reconnaissance has indicated an abundance of habitat for dusky footed woodrats. Other prey species (e.g., voles, mice, rabbits and hares, birds, and insects) may be seasonally or locally important.

Barred Owl Occurrence

Our records show no barred owl detections in the project vicinity. However, given the lack of surveys in the project vicinity and the ubiquity of barred owl detections on the larger landscape around the project, it is possible they occur in the vicinity of the proposed actions.

Forest Service Sensitive Species

Pacific Fisher, American Marten and California Wolverine

The quality of suitable habitat in the analysis area for fisher, marten and wolverine is variable. The analysis area contains late-seral, mixed-conifer forest that includes high amounts of large woody debris and snags as preferred by these species, and there is a general lack of human-caused fragmentation; however, portions of the project area have sustained multiple high-severity wildfires that have fragmented the canopy and continuity of the forest structure.

Habitat suitability for fisher, marten and wolverine within the proposed treatment areas varies depending on recent fire activity, canopy closure and stand composition, proximity to water, elevation, and the abundance of snags and downed logs - though in general the higher elevations of the project area may contain suitable habitat for marten and the lower elevations habitat for fisher. The overall isolated nature of the wilderness area is somewhat offset by the frequency of human visitation to the area for recreational purposes.

Therefore, while there is a somewhat higher likelihood that these three species may occur in the area, multiple factors detract from the ability of the analysis area to provide all the elements of high quality habitat preferred by the wolverine.

Northern Goshawk

Northern goshawks can be found in middle and higher elevation mature coniferous forests, usually with little understory vegetation and flat or moderately sloping terrain. Moderate and high quality habitats contain abundant large snags and large logs for prey habitat and plucking posts (Squires and Reynolds 1997). Goshawks generally breed in mature, coniferous, mixed, and deciduous forest habitats. This habitat provides large trees for nesting, a closed canopy for protection and thermal cover, and open spaces allowing maneuverability below the canopy (Squires and Reynolds 1997). Goshawks are the largest North American accipiter and can consequently hunt a large variety of prey including woodpeckers, owls, tree squirrels, and grouse.

Goshawks have the potential to occur in the project area as suitable habitat exists in areas less affected by high-severity wildfire, particularly along drainages and north facing slopes.

Because suitable habitat exists in the project area, within areas less impacted by wildfire, along drainages and on some north facing slopes, it is possible that goshawks occur in the project area.

Fringed Myotis

Fringed myotis (*Myotis thysanodes*) is predominantly a western bat species occurring from southern British Columbia, Canada (where it is only known from a few specimens), south through southern Mexico. Fringed myotis are generally found between 3,000 to 5,000 feet in elevation, though will occasionally occur in lower elevations near coastal areas. They occur within a broad range of vegetation types but are mostly commonly reported to occur in pinyon juniper, oak, ponderosa pine and mixed conifer forest types (Keinath 2004).

Suitable roosting sites are a critical habitat component, the availability of which can determine population sizes and distributions (Keinath 2004, Humphrey 1975). Roosting sites and their characteristics include the following:

- maternity roosts: found in caves, mines, abandoned buildings, bridges, and rock crevices;
- diurnal and nocturnal roosts: tree snags, live trees, caves, mines, buildings, briges and rock crevices;

- winter hibernacula: caves, mines or buildings with little temperature fluctuation throughout the winter.

Fringed myotis are morphologically adapted to forage in areas of relatively high vegetation clutter –such as interior forests and/or their edges – rather than wide openings such as clearcuts or meadows.

While there are no documented occurrences of fringed myotis in the project area, it is possible that the species occurs there, as the important habitat elements are present in the area and this species has been found on the Shasta-Trinity National Forest, though only as a rare occurrence (Pierson and Rainey 2007).

Western Bumble Bee

Populations of western bumble bees (*Bombus occidentalis*) in states along the west coast of the U.S. have declined dramatically since the 1990s. Prior to 1998, the western bumble bee was both common and widespread throughout the western United States and western Canada. While viable populations still exist in Alaska and east of the Cascades in the Canadian and U.S. Rocky Mountains, the once common populations of central California, Oregon, Washington and southern British Columbia have largely disappeared.

The recent dramatic decline of the western bumble bee in the west is speculated to be due to disease. It is currently speculated that commercial rearing and export of western bumble bees resulted in the unintentional transport of parasites and diseases, possibly causing its dramatic decline and potential extirpation from the west coast of the United States in very recent years (Rao and Stephens 2007).

Fire suppression may in time result in conversion of open meadows to forested habitats, potentially reducing availability of meadow nest sites for this species (Evans et al. 2008, Koch et al. 2012, Xerces Society 2013). The impacts from these threats are exacerbated by the already extremely low numbers of the species in the wild.

Western bumble bees are generalist foragers, feeding on pollen and nectar from a diverse array of plant species. Bumble bee colonies depend on floral resources for all their nutritional needs. As generalist foragers, they do not depend on any one flower type, though some plants rely specifically on bumble bees to achieve pollination (Xerces Society 2013). They are commonly found in riparian habitats, meadows and recently disturbed areas that contain abundant flowering plants.

Western bumble bees primarily nest underground, typically in abandoned rodent nests located from six to eighteen inches below the surface (Thorp et al. 1983; Laverty and Harder 1988). Colonies are annual, with colonies started by solitary queens in the spring, then the production of workers, and finally to production of queens and males (Evans et al. 2008, Xerces Society 2013).

The likelihood that western bumble bees occupy the Trinity Alps project area is low due to the increasingly rare distribution and abundance of the species. Due likely to the very recent addition of this species to the R5 Regional Forester's Sensitive Species List (USDA Forest Service 2013b), this species is not listed in CNDDB and past detections on the Shasta-Trinity have not been entered into the NRIS database; therefore, these standard information sources were not useful in this analysis. Species specific surveys have not been conducted in the project area. However, through examination of research

papers, district records, and personal communication with bumble bee expert Dr. Robbin Thorp (UC Davis), historic and current sightings and location information for this species was obtained for this analysis. Detection information was also obtained from published bumble bee guides and research papers (Koch et al. 2012; Hatfield et al. 2012). No detections have been made in the project area, though the area is within the species' range.

The project area is within designated wilderness and is, therefore, less fragmented and affected by current threats to bumble bees (i.e. urbanization, agriculture, pesticides, and exposure to commercially raised bees); habitat within the project area is of a potentially higher quality than in other, non-wilderness areas. In addition, livestock grazing no longer occurs in the project area, and native flowering resources are subsequently rebounding. Furthermore, the recent Corral fire (adjacent to and within the project area) may have resulted in new areas of flowering vegetation growing in more open areas with reduced canopy and early seral vegetation that may provide suitable foraging habitat for bumble bees.

Riparian Associated Species

Riparian vegetation in the project area comprises approximately 500 acres adjacent to the 18.4 miles of larger order streams, such as Virgin Creek and Slide Creek, within the Upper New River watershed. Because the following species are associated with riparian habitat, and therefore fall into logical groupings, they will be discussed together below.

The **Cascade frog** inhabits permanent ponds and streams above 3,000 feet elevation and can survive in ephemeral water bodies where at least some substrate remains saturated. Open, shallow water that remains unshaded during the hours of strong sunlight provide egg-laying sites. Aquatic sites where this species is found are characterized by a low accumulation of dissolved nutrient salts, supporting a sparse plant and animal life, and having high oxygen content owing to the low organic matter (Blaustein et al. 1995).

The Cascade frog may occur in the project area, as suitable habitat occurs in creeks and wet areas within the drainages. Though there are no known occurrences in the project area, this species has been detected in the eastern portion of the Trinity Alps Wilderness, with the nearest location approximately three miles east of the project area boundary.

The **southern torrent salamander** seldom ventures away from saturated streamside areas, occurs within a relatively narrow range of physical and microclimatic conditions and is associated with cold, clear headwater to low-order streams with loose rocky substrates (low sedimentation) in humid forest habitats with large conifers, abundant moss, and greater than 80 percent canopy closure. Thus, the southern torrent salamander demonstrates an ecological dependence on streamside conditions of microclimate and habitat structure that are typically best created, stabilized, and maintained within late seral forests in northwestern California (Welsh and Lind 1996).

It is possible that southern torrent salamanders occur in the project area; however, in general, the project area is characterized by a drier moisture regime and higher elevational range than this species normally occupies. While there are no known occurrences in the project area, this species has been detected in multiple locations west of the project area, with the nearest detection approximately three miles to the west.

Small amounts of suitable habitat may occur in creeks and wet areas within the drainages if sufficient moisture regime, surface substrate and canopy cover are present.

Northwestern pond turtles are associated with permanent or nearly permanent water from sea level to 6,000 feet in elevation. The northwestern pond turtle is only found in Washington through northern California, including some aquatic habitats on the Shasta-Trinity NF. This species prefers quiet stretches of moving water on ponds, lakes, major rivers and streams. Important habitat elements such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks, are used as basking sites and refuge from predators. Nest sites generally occur within 0.25 mile of water sources, and are usually characterized as open areas dominated by grasses and herbaceous annuals with a southern exposure (Holland 1991).

Distribution and abundance of northwestern pond turtles in the Forest and within the Trinity Alps Wilderness is not well known due to a lack of survey information. There are no recorded occurrences within the project area or the Trinity Alps Wilderness. According to the California Natural Diversity Database (CNDDB),[23] the nearest recorded detection is approximately 14 miles south of the project area. It is likely that this species occurs within the project area, as suitable habitat occurs along the larger creeks that support important habitat elements such as downed logs and matted vegetation for basking sites.

Western red bats are locally common in some areas of California; occurring from Shasta County to the Mexican border, west of the Sierra Nevada/Cascade crest and deserts (Zeiner 1990). Red bat winter range includes western lowlands and coastal regions south of San Francisco Bay. The western red bat is typically solitary, roosting primarily in the foliage of trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. Red bats require water and are associated with intact riparian habitat, particularly willows, cottonwoods, and sycamores.

It is unlikely that western red bats occur within the project area, as presence of the red bat on the Shasta-Trinity National Forest is limited. In addition, there are no known locations of western red bat roost sites in the project area or on the STNF as a whole, though habitat exists. It is unknown whether the higher elevation of portions of the project area influences the likelihood of this species to be present. Altitudinal distribution has been described as one of the gaps in knowledge with a need for further research for the western red bat (Bolster 2005).

The **Pressley Hesperian snail** inhabits conifer and/or hardwood forest habitat in permanently damp areas near seeps, springs and stable streams, up to 3,000 feet in elevation. Woody debris and rock refugia near water are used by the species during dry and cold periods. Herbaceous vegetation and leaf litter are common habitat elements associated with this species (Duncan et al. 2003).

There are no recorded occurrences of this species within the project area or the Trinity Alps Wilderness, though no protocol surveys have been conducted in or near the project

[23] Available online at http://www.dfg.ca.gov/biogeodata/cnddb/

area. According to the CNDDB, the nearest recorded detection is approximately 14 miles south of the project area.[24] Because suitable habitat occurs in the project area along creeks and near seeps, springs and permanently wet areas, it is possible that the species occurs in the project area. However, most of the project area is above the elevational range for this species. If this species were to occur, it would likely be within the lower drainages near the permanently flowing creeks.

Management Indicator Assemblages

Management indicator assemblages (MIA) are groups of wildlife associated with vegetation communities or key habitat components, as identified in the Forest Plan (page 3-24). The Forest Plan directs resource managers to monitor assemblage habitat trends at the National Forest scale (Forest-level).

Six habitat assemblages were analyzed within the Trinity Alps Project MIA Report, as they were determined to be either directly or indirectly potentially affected by the proposed project. The assemblages were: Openings and Early Seral, Late Seral, Snag and Down Log, Hardwood, Riparian, and Chaparral.

Currently, the project area consists of a wide variety of habitat types that are present in various seral stages within multiple vegetation types, due in large part to the wildfires that have occurred in the last 15 years.

Migratory Birds

The Shasta-Trinity National Forest mostly lies in the USFWS Bird Conservation Region (BCR) 5 (Northern Pacific Rainforest). The following species occur on the Forest; they are also listed by USFWS as birds of conservation concern for the BCR 5 (species that do not occur on the Forest have been deleted):

- western grebe
- bald eagle
- northern goshawk
- peregrine falcon
- Caspian tern
- black swift
- rufous hummingbird
- Allen's hummingbird
- olive-sided flycatcher
- willow flycatcher
- horned lark
- purple finch

[24] From Shasta-Trinity National Forest GIS data (see the project record)

Migratory bird habitats within the project area that would be affected by the proposed activities include early seral conifer and brush, mid and mature coniferous forests, snag and downed logs, and a small amount of riparian habitat.

Environmental Consequences

Northern Spotted Owl (NSO)

Alternative 1

Direct, Indirect and Cumulative Effects

No direct effects to NSO are expected from Alternative 1 as no fuel management activities would occur. Potentially, indirect effects may occur if this alternative were implemented (which would reduce the fire resiliency of the project area) and high-intensity wildfires occur that result in further loss of habitat for NSOs. The risk of high-intensity future fires would increase under this alternative when combined with ongoing fire suppression.

Alternative 2

Direct Effects to NSO Habitat

No direct effects are expected from the proposed activities because project design features described in Chapter 2 would avoid disturbances during critical periods of the breeding season or when young owls are not mobile enough to readily move from a disturbance. Because NSOs are highly mobile, it is expected that adults foraging or dispersing across the landscape can easily avoid activities that create smoke or noise above ambient levels. However, juveniles that are not yet able to fly and adults that are closely defending a nest may be vulnerable to such activities. Therefore, a seasonal restriction of February 1st to September 15 would be applied to all activities that 1) create noise above ambient levels and 2) smoke within 0.25 mile suitable NSO nesting/roosting habitat and 3) activities that may modify habitat.

Indirect Effects to NSO Habitat

Concerns over impacts to habitat from fire generally center on whether the canopy survives relatively intact, though other concerns can also include the availability of large woody debris and snags and the amount of duff consumed by prescribed fire (Smith et al. 2000, Webster and Halpern 2010). Other concerns involve the loss of large overstory trees from the intense heating of a deep duff and debris layer and subsequent killing of the roots and/or girdling of the tree at the roots that can occur during a fire in areas where fire has been excluded for long periods of time (Knapp et al. 2005).

For the Trinity Alps project, these concerns are alleviated because so much of the analysis area has burned (with varying intensities) in the relatively recent past that the duff layer has burned down to levels more in line with historical conditions. However, as a consequence of these past fires, levels of large woody debris are much higher than would have been present historically and present a risk of intense burning if they were to ignite under unfavorable conditions (see Figure 3.4 below).

Figure 3.4. High levels of snags and large downed woody debris occur throughout the project area.

Proposed project activities would not remove or downgrade any NSO nesting/roosting habitat. Some elements of currently suitable habitat may be altered if understory components are removed by fire, which may result in short-term impacts to the forest structure. Understory vegetation would begin to recuperate the following season and likely return within approximately 10 years. Because of the method by which fire would be applied, i.e. ignited during cooler, wetter periods, on ridgetops and allowed to back down the slope in a mosaic burn pattern, high-intensity fire is not expected in NSO habitat. The prescribed fire would not be expected to result in habitat degradation, and would only slightly modify the suitability of relatively small portions of habitat for NSO in the short term while improving long-term habitat suitability and resiliency. In addition, the location of the ignition, i.e. along ridgetops, defers some of the risk to suitable habitat due to NSO tendencies to avoid ridgetops particularly for nesting.

As described in the Fuels and Vegetation section above, risks to NSO habitat from the proposed ignition are much lower than if the ignition were to occur under unfavorable weather or fuels conditions (i.e. during the normal fire season). Fuel and fire modeling conducted for the project show the projected fire behavior during implementation within the treatment areas and identified areas at a higher risk of crown fire (i.e. loss of overstory) and areas where the fire is more likely to burn with low intensity as a ground fire. Approximately two acres were identified as at risk of active crown fire during implementation of the prescribed fire. All areas identified as at risk of active crown fire are outside of any currently intact NSO core areas.

The duration and magnitude of impacts in relation to the overall size and distribution of available NSO habitat in the analysis area is expected to be minimal.

Cumulative Effects to NSO Habitat

The only activities that occur within the analysis area and have potential to overlap in space and time with the proposed project are ongoing trail maintenance and fire suppression (should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance to which species within the project area have, at least to some degree, become acclimated.

The proposed treatments are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because there are no other actions planned in the analysis area that would overlap in space and time with the project and impact the quality or quantity of available northern spotted owl habitat. In addition, there are no activities that would cause additive direct or indirect impacts that would collectively or individually impact habitat for the northern spotted owls that may occur in the analysis area.

Based on the above analysis of the proposed action, using the most current available scientific information, implementation of the project may affect, but is not likely to adversely affect the northern spotted owl. This is based on the following:

a) All project activities will have a Limited Operating Period (LOP) from February 1st to September 15 to avoid disturbance to unknown nests that may occur within the project area during project implementation.
b) Beneficial effects are expected from the proposed prescribed burning, as the forest becomes more fire resilient, the natural fire cycle returns and fire can play its natural role in the ecosystem.
c) NSO habitat would be maintained or improved with the proposed treatments.
d) No suitable NSO nesting, roosting, or foraging habitat is expected to be degraded, downgraded or removed.

Direct, Indirect and Cumulative Effects to NSO Critical Habitat

Implementation of the project will not affect Critical Habitat for the northern spotted owl. The project area is not within designated NSO Critical Habitat (as revised in 2012), so no direct, indirect or cumulative effects are expected.

Direct, Indirect and Cumulative Effects to NSO Prey Species

Prescribed burning may impact habitat for flying squirrels by reducing coarse woody debris (CWD), duff and litter on the forest floor. These short-term post-fire changes are expected to dissipate rapidly as litter accumulates beneath the forest canopy, once more providing organic material for truffles and foraging for flying squirrels.

Prescribed burning would consume much of the woody debris present in the treatment areas, which may cause localized impacts to woodrats that may occur within these areas. However, there is such an abundance of habitat in the form of downed woody debris of a wide range of size classes that the removal of relatively small quantities in localized areas is highly unlikely to have measurable or meaningful impacts to this species.

Only specific, localized areas, i.e. treatment areas, would be impacted with any given treatment, and these areas would likely only support small numbers of prey relative to the abundance of overall available habitat, particularly for woodrats. In addition, both flying squirrels and woodrats are mobile animals which can likely avoid direct impacts from an approaching low intensity fire, particularly during the non-reproductive season.

In summary, the proposed treatments are unlikely to negatively impact the NSO that may occur in the area through impacts to its prey, given the size of the impacted area in relation to the amount and distribution of habitat favored by its primary prey species. There is likely sufficient prey in the area, given the amount of suitable habitat available in the wilderness, as to provide ample foraging opportunities for the NSO.

Alternative 3

The direct, indirect and cumulative impacts from Alternative 3 for the northern spotted owl are not discernable from the impacts described above for Alternative 2. The addition of a relatively small number of treatment acres in areas of very similar habitat under the same burning conditions and the same project design features would have no meaningful additional impacts to this species.

Potential Barred Owl Related Impacts

Potential additive impacts related to NSO/barred owl interactions are not considered meaningfully measurable. The duration and magnitude of these impacts in relation to the overall size and distribution of available habitat in the analysis area is not expected to be significant. This conclusion is based upon the following rationale:

l) The project's Limited Operating Period avoids disturbance to NSO during times when adults are reluctant to move from their young or when young owls are not mobile enough to readily move from either an anthropogenic or barred owl-related disturbance.

2) Dugger et al. (2011; see BA literature) found that extinction of NSO territories with barred owl occurrence was lowest in areas where old forests were most abundant. In the event of a barred owl/NSO interaction, and given the low impact to habitat expected from the proposed actions, the amount of suitable habitat where NSO could find refuge from barred owls would remain unchanged.

a) The proposed project activities would not remove or downgrade any NSO nesting/roosting or foraging habitat, and are expected to maintain and/or improve NSO habitat in the long term.

b) NSOs avoid ridgetops, particularly for nesting. Therefore, limiting ignitions to ridgetop areas will limit the impact these treatment would have on NSOs.

Forest Service Sensitive Species

Alternative 1

Direct, Indirect and Cumulative Effects

No direct effects are expected from Alternative 1 as no fuel management activities would occur. Potentially, indirect effects may occur if this alternative were implemented (which would reduce the fire resiliency of the project area) and high-intensity wildfires occur that result in further loss of habitat for Forest Service Sensitive Species. The risk of high-intensity future fires would increase under this alternative when combined with ongoing fire suppression.

Alternative 2

Pacific Fisher, American Marten and California Wolverine

While the likelihood of occurrence in the project area differs between these three species – fisher are very likely present, marten are unlikely to be present and wolverine are highly unlikely to be present – essential habitat elements and the impacts to these elements from project activities are similar enough to warrant discussion of impacts to these species together.

Direct Effects

Parturition for fisher, marten, and wolverine occurs anytime between February and mid April, and young are completely mobile and capable of normal locomotion by 10-12 weeks old, which would mean that any young that may occur in the project area would be old enough by September 15 (end of the limited operation period) to move away from a source of disturbance (e.g., humans or fire) (Ruggiero et al. 1997). Therefore, failed reproduction or a disruption of critical behaviors such as attendance to the young, the ability to forage or hunt, or the ability to move young between dens would not be likely from the proposed activities.

Ignition of prescribed fire would occur on ridge tops, with fire allowed to back down the slope in a mosaic pattern. Adults of these species are highly mobile and capable of moving away from sources of disturbance (Kennedy and Fontaine 2009). Fisher and marten tend to avoid ridgetops and generally use the lower slopes and riparian corridors for travel and resting. Wolverine tend to occupy subalpine vegetation and will often select for rocky areas for resting and foraging (Harris and Ogan 1997). It is therefore highly unlikely that, if these species were to occur in areas proposed for treatment, they would be directly impacted by the presence of humans in the area during project implementation, by smoke in the air, or by low-intensity fire backing down slope from the ridgetops. Therefore, direct effects are not expected.

Indirect Effects

Prescribed fire and its associated activities are not considered a threat to fisher population viability and are not expected to have any deleterious impacts to the species. Fisher, marten and wolverine populations are susceptible to habitat loss and fragmentation in addition to genetic isolation and high mortality rates from fur trapping (for marten)

(Ruggiero et al. 1997). Changes to climate and subsequent loss of late season snow in high elevation mountain ranges are also listed as threats to wolverine (USDI Fish and Wildlife Service 2010). The proposed activities do not include any of these threats, and instead would likely result in a beneficial impact by reducing the susceptibility of the remaining suitable habitat in the area to loss from intense wildfire.

Prescribed fire is not likely to affect currently intact suitable habitat due to the conservative treatment prescriptions that would be implemented – low intensity burning, backing down slope to achieve a mosaic of burned and unburned vegetation with little to no active crown fire or subsequent loss of overstory structure.[25]

Habitat for these three species would be promoted through the incorporation of Forest Plan Standards and Guidelines for snags and downed logs and guidelines for riparian reserves. It is, therefore, unlikely that habitat for these three species would be negatively affected by treatments within these areas.

Cumulative Effects

Spatial bounding encompasses the 6th field watersheds within which the project occurs because the majority of the research done on the effects of prescribed fire on wildlife is done on this scale or smaller (Smith 2000) and watershed boundaries provide a method to delineate a landscape level assessment (used in this context and by Smith et al. 2000 as approximately 25,000 acres or more). Temporal bounding for this analysis is defined by those actions in the reasonably foreseeable future (10 years) such that projects or activities that would overlap in space and time within this bounding would be accounted for in this analysis.

The only activities that occur within the analysis area and have potential to overlap in space and time with the proposed action are ongoing trail maintenance and fire suppression (should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance to which species within the project area have, at least to some degree, become acclimated.

The proposed treatments are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because no other actions are planned in the analysis area that would overlap in space and time with the project and impact the quality or quantity of available fisher, marten or wolverine habitat. In addition, no activities would cause additive direct or indirect impacts that would collectively or individually impact habitat for the fisher, marten or wolverine that may occur in the analysis area. Implementation of the project may impact individual Pacific fisher, American marten and California wolverine, but would not cause a trend towards federal listing.

Northern Goshawk

Direct Effects

There are no known current or historic goshawk nests in the analysis area. However, because suitable nesting habitat does exist in areas near or adjacent to treatment areas, it

[25] See the project Fire, Fuels, Air Quality and Vegetation Report in the project record.

is possible that these areas contain unknown nests or may be used for foraging. However, with project implementation period beginning after September 15, nesting season for goshawks (February 1 to August 15) would be avoided, and would thereby avoid direct effects to the more vulnerable young and impacts to overall reproductive success of any goshawks that may be present in the area. In addition, goshawks are highly mobile, and can fly away from an oncoming source of disturbance such as fire. Therefore, it is highly unlikely that individual goshawks would be injured or killed during project implementation.

Indirect Effects

The proposed action would not remove existing goshawk habitat and would likely benefit habitat conditions into the future. Reynolds and others (2006) emphasize the importance of developing and maintaining mosaics of vegetation patches in different successional states within goshawk home ranges in order to provide an abundant and diverse prey base as well as adequate nesting and foraging habitat. Habitat within the project area would be maintained with these parameters, as prescribed fire influences the understory vegetation composition in addition to the level of downed woody debris and snags. Indirect effects to goshawk habitat would therefore likely be beneficial, as habitat for goshawk prey species as well as nesting and foraging would be developed and maintained through the application of low intensity, mosaic burning within the understory.

Cumulative Effects

Spatial bounding encompasses the 6th field watersheds within which the project occurs because the majority of the research done on the effects of prescribed fire on wildlife is done on this scale or smaller (Smith 2000) and watershed boundaries provide a method to delineate a landscape level assessment (used in this context and by Smith et al. 2000 as approximately 25,000 acres or more). Temporal bounding for this analysis is defined by those actions in the reasonably foreseeable future (10 years) such that projects or activities that would overlap in space and time within this bounding would be accounted for in this analysis.

The only activities that occur within the analysis area and have potential to overlap in space and time with the proposed action are ongoing trail maintenance and fire suppression (should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance to which species within the project area have, at least to some degree, become acclimated.

The proposed treatments are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because there are no activities that would cause additive direct or indirect impacts that would collectively or individually impact goshawks or goshawk habitat that may occur in the analysis area. Implementation of the project may impact individual northern goshawk, but would not cause a trend towards federal listing.

Fringed Myotis

Direct and Indirect Effects

Effects to potential day roosts

Any change in habitat that modifies microclimate in and near roosts (e.g., airflow and/or thermal regime) can substantially impact the suitability of both the foraging habitat outside the roost and the microclimate within the roost itself. Modification of cave and mine entrances, including substantial vegetation alterations outside the entrances, can alter thermal and airflow characteristics of roosts. Modification of the forest around tree snags can alter solar and wind exposure, thereby making an otherwise suitable roost unfit for bat occupancy because it is too hot or cold to allow bats to effectively thermoregulate.

There are no known caves, large rock outcroppings or structures in the proposed treatment areas; though smaller rock crevices may exist throughout the project area. Large snags are also present in the project area that could be used as day roosts if they occur in an appropriate microclimate. It is possible that snags may catch fire during burning operations, though this is an uncommon occurrence when burning under the weather and fuel conditions prescribed for burning operations. Snags are not proposed for intentional felling unless they pose a threat to human safety during operations; therefore risk of loss due to direct felling is extremely low. The transient nature of snags as day roosts reduces the impact of their loss to the species, in part because of their overall abundance and also because they are much more easily replaced than more permanent and reproductively important structures such as caves and rock outcroppings.

Limited Operating Periods (LOP) are in place from Feb. 1 to Sept. 15 in order to avoid disturbance and potential direct impacts to northern spotted owls (NSO). LOPs would reduce the likelihood of encountering roosting bats since fringed myotis tend to move to lower and more southerly hibernacula in the fall months and, if present, may have begun their migration prior to project implementation.

It is important to emphasize the low likelihood of fringed myotis occurring in the project area, and the subsequent low likelihood of the proposed project impacting a roost site or an individual during implementation, as this species is rare and sparsely distributed within its range.

Effects to foraging habitat

While prescribed fire has the potential to protect suitable forested habitat from high-severity wildfire, it would also temporarily remove portions of vegetation that fringed myotis could use for foraging. However, the abundance of available habitat throughout the project area outside of the proposed treatment areas, and within the Trinity Alps Wilderness as a whole, in combination with the low likelihood that this species would occur in the project area, greatly reduces the potential for effects to this species through impacts to its foraging habitat.

Effects to potential maternal roosts (caves, mines, and rock outcroppings)

Because structures such as caves, mines, or buildings would not be removed or altered with the project activities, and if discovered in the project area, would be protected from disturbance (with LOPs) and habitat modification (with protection buffers), disruption to

key life history stages for fringed myotis, i.e. breeding and hibernating females, would not be expected to occur; therefore, population level impacts are not expected.

The most important aspects of this species life history, i.e. maternal and nursery roosts are protected through design features; therefore, population level effects are not expected.

Effects to hibernacula

Fringed myotis are not known to hibernate in the higher elevations such as the project area. Even if some individuals were present during the winter, no project activities would occur during the winter, and no impacts would be expected.

Cumulative Effects

The only activities that occur within the analysis area and have potential to overlap in space and time with the proposed action are ongoing trail maintenance and fire suppression. These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance to which species within the project area have, at least to some degree, become acclimated.

Implementation of Alternative 2 is not expected to have negative cumulative impacts to the habitat or the species within the analysis area because the above ongoing actions would not impact the quality or quantity of available habitat. These actions would not cause additive direct or indirect impacts that would collectively or individually impact fringed myotis habitat that may occur in the analysis area.

Based on the above analysis, implementation of Alternative 2 may impact individual fringed myotis bats, but would not likely to lead to a trend to federal listing.

Western Bumble Bee

Direct and Indirect Impacts

In the unlikely event that western bumble bees do use the project area, project activities may temporarily displace individual foraging bees during project implementation. This species is a generalist forager and not restricted to any one plant, and is therefore capable of utilizing a wide variety of flowering resources; such that if an area containing one type of flower (i.e. manzanita flower) is impacted during operations, this species can readily move to another area with other types of flowering vegetation.

Direct effects to underground nests would be avoided due to both the lack of mechanized equipment and the season of implementation. In addition, hibernating bees would not be affected because the Limited Operating Period would preclude potentially disturbing activities during the hibernation period.

Indirect effects to foraging habitat may occur during project implementation when flowering resources may be burned. Prescribed burning can temporarily reduce the abundance flowering plants in a specific area but can also increase availability in the long term as this type of disturbance can cause increased nutrient availability in the soil and remove encroaching woody vegetation.

In addition, the vast majority of the available bumble bee habitat in the Trinity Alps Wilderness would be unaffected by the proposed activities, thereby allowing any bumble bees in treatment areas alternative areas to forage.

Cumulative Effects

Proposed treatments are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because there are no other actions planned in the analysis area that would overlap in space and time with the project and impact the quality or quantity of available habitat (ongoing trail maintenance and fire suppression, should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance that species within the project area have, at least to some degree, become acclimated to. In addition, there are no additional activities that would cause additive direct or indirect impacts that would collectively or individually impact habitat that may occur in the analysis area. The project may impact individuals but would not cause a trend towards federal listing or a loss of viability.

Riparian-Associated Species

Direct and Indirect Effects

Potential impacts may occur within the riparian vegetation near the creeks included in the proposed treatments, i.e. creeks that have historically served as successful suppression lines such as Slide Creek, North Fork Creek, and New River. Subsequent impacts may then occur to the species associated with this habitat type such as northwestern pond turtle, southern torrent salamander, Cascade frog, western red bat, and Pressley hesperian snail.

The majority of the areas to be treated are upslope from the riparian areas where the species described above would occur, though fire would be allowed to back down, with low intensity, to Slide Creek, North Fork Creek, and New River. While the prescribed fire would be allowed to back down from the ridges, it would not be ignited directly within any drainage or riparian area. This method allows for the retention of the overall structure and function of the habitat while removing the old, decadent understory vegetation and higher accumulations of dead and down fuel that pose a risk to the overall area in the event of a wildfire occurring in unfavorable burning conditions. By removing the highest concentrations of fuel, the risk of loss of larger expanses of habitat from high intensity fire is reduced.

Research has indicated that, herpetofauna[26] in general will seek refuge in wet or moist microhabitats when confronted with an advancing fire (Russell et al. 1999). If a turtle, frog or salamander were present and confronted with approaching fire it can be presumed that it would seek cover in the nearby moist areas or directly to the water. Direct effects may occur if the animal was unable to access these refugia, but it can be inferred that if the species is present in the area, then the appropriate moisture regime would also be present and subsequently offer refugia if needed. Current scientific literature also

[26] Herpetofauna – reptiles or reptile life, especially of a particular region

indicates that low to moderate fire in general has little direct effect on most amphibians and reptiles, and that it can be presumed that animals associated with fire adapted vegetation are themselves at least behaviorally adapted to resist mortality by fire (Russell et al. 1999).

Western red bats are associated with riparian vegetation and are highly mobile. The exceptions to their mobility are when young are first born and unable to fly, and during hibernation. Red bats give birth in the spring and young are volant by early summer. If prescribed fire was ignited in areas where adult red bats occur, it is likely that the bats would simply fly to a different, undisturbed area. In addition, it is highly unlikely that red bats would occur in the project area during implementation, as this species migrates during the late summer and early fall to lower elevations, closer to the valleys and out of the higher elevations affected by snow. Therefore, because timing of project implementation would not overlap with periods of reduced mobility for the red bat, i.e. just after birth of young or hibernation, no direct impacts to this species are expected.

Impacts to **Pressley hesperian snail** are not expected as this species is closely tied to water within springs or seeps. No treatments would occur within 100 feet of any spring or seep (see Project Design Features). Additionally, impacts to the species associated with the riparian or aquatic habitat in the project area are expected to be negligible, as the Aquatic Conservation Strategy would be applied to all aspects of project activities, and riparian habitats would retain their important habitat characteristics and remain intact.

Cumulative Effects

The proposed treatments are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because no other actions are planned in the analysis area that would overlap in space and time with the project and impact the quality or quantity of available riparian habitat (ongoing trail maintenance and fire suppression, should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance that species within the project area have, at least to some degree, become acclimated to. In addition, no activities would cause additive direct or indirect impacts that would collectively or individually impact riparian habitat that may occur in the analysis area. Implementation of the proposed project may affect individual southern torrent salamanders, Cascade frogs, northwestern pond turtles, red bats, or Pressley hesperian snails, but would not cause a trend towards federal listing or a loss of viability

Alternative 3

Pacific Fisher, American Marten, California Wolverine, and Northern Goshawk

Direct, Indirect and Cumulative Effects

Alternative 3 differs from Alternative 2 in the total acres burned with the addition of 2,379 acres, for a total of approximately 19,088 acres of prescribed fire. The addition of a relatively small number of treatment acres in areas of very similar habitat under the same burning conditions and the same project design features would add no measurable impacts to these species. Direct, indirect and cumulative impacts from Alternative 3 for

the **Pacific fisher, American marten, California wolverine,** and **northern goshawk** are not discernable from the impacts described above for Alternative 2.

Fringed Myotis

Direct and Indirect Effects

The direct and indirect effects from Alternative 3 for the fringed myotis are not discernable from the impacts described above for Alternative 2 because the addition of a relatively small number of treatment acres in areas of very similar habitat under the same burning conditions and the same Project Design Features would have no meaningful additional impacts to this species. The effects of treating an additional 2,379 acres (eight percent), of which a portion would be in the Virgin Creek drainage, are indistinguishable from those from Alternative 2.

Cumulative Effects

Proposed treatments under Alternative 3 are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because no other actions planned in the analysis area that would overlap in space and time with the project would impact the quality or quantity of available habitat (ongoing trail maintenance and fire suppression, should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance that species within the project area have, at least to some degree, become acclimated to. In addition, there are no activities that would cause additive direct or indirect impacts that would collectively or individually impact fringed myotis habitat that may occur in the analysis area. Implementation of Alternative 3 may impact individual fringed myotis bats, but would not likely to lead to a trend to federal listing.

Western Bumble Bee

Direct and Indirect Effects

The direct and indirect effects from Alternative 3 for the western bumble bee are not discernable from the impacts described above for Alternative 2 because the addition of a relatively small number of treatment acres in areas of very similar habitat under the same burning conditions and the same Project Design Features would have no meaningful additional impacts to this species. The effects of treating an additional 2,379 acres (eight percent), of which a portion would be in the Virgin Creek drainage, are indistinguishable from those from Alternative 2.

Cumulative Effects

Proposed treatments are not expected to have negative cumulative impacts to the habitat or the species within the analysis area because there are no other actions planned in the analysis area that would overlap in space and time with the project and impact the quality or quantity of available habitat (ongoing trail maintenance and fire suppression, should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of

ambient noise and disturbance that species within the project area have, at least to some degree, become acclimated to. In addition, there are no additional activities that would cause additive direct or indirect impacts that would collectively or individually impact habitat that may occur in the analysis area. Riparian-Associated Species.

Under Alternative 3, fires ignited on the ridgelines in the Virgin Creek drainage would be allowed to back down to the creek. Potential impacts to riparian vegetation, and subsequently to riparian-associated species, may occur. The project may impact individuals but would not cause a trend towards federal listing or a loss of viability.

Riparian-Associated Species

Direct Effects

Research has shown that in general, herpetofauna will seek refuge in wet or moist microhabitats when confronted with an advancing fire (Russell et al. 1999). Most areas to be treated are upslope from the riparian areas where the species described above would occur, with the exception of the treatments applied upslope from Virgin Creek under Alternative 3. Prescribed fire would be allowed to back down from the ridges, but would not be ignited directly within any drainage or riparian area.

If a turtle, frog or salamander were present and confronted with approaching fire it would likely seek cover in nearby moist areas or directly in the water. Direct effects may occur if an animal were unable to access these refugia, but it can be inferred that if the species is present in the area, then the appropriate moisture regime would also be present and subsequently offer needed refugia.

Currently available information indicates that low-to moderate-intensity fire in general has little direct effect on most amphibians and reptiles, and it can be presumed based on current scientific literature that animals associated with fire adapted vegetation are themselves at least behaviorally adapted to resist mortality by fire (Russell et al. 1999).

Indirect Effects

Prescribed fire is indicated as an appropriate management tool that can be used with other treatments to benefit herpetofauna, and other species that are associated with riparian habitats, by restoring a historical mosaic of successional stages, habitat structures, and plant species compositions (Russell et al. 1999). After extensive research on the effects of prescribed fire on herpetofauna, Russell et al. (1999) concluded that "although fire-induced disturbance may decrease herpetofauna diversity within a particular patch, a mosaic of successional stages and habitat structures should increase diversity on a broader scale."

In addition, as the Aquatic Conservation Strategy would be applied to all aspects of project activities, riparian habitats would retain their important habitat characteristics and remain intact.

Cumulative Effects

Proposed treatments are not expected to have negative cumulative impacts to riparian-associated species or their habitat within the analysis area because the only activities that

occur within the analysis area and have potential to overlap in space and time with the proposed action are ongoing trail maintenance and fire suppression (should a wildfire occur during unfavorable weather and fuel moisture conditions). These activities are seasonal and ongoing from year to year and are part of the general baseline of ambient noise and disturbance that species within the project area have, at least to some degree, become acclimated to. In addition, there are no activities that would cause additive direct or indirect impacts that would collectively or individually impact the habitat that occurs in the analysis area. Implementation of the proposed project may affect individual southern torrent salamanders, Cascade frogs, northwestern pond turtles, red bats, or Pressley hesperian snails, but would not cause a trend towards federal listing or a loss of viability

Management Indicator Assemblages (MIAs)

Alternative 1

Direct, Indirect and Cumulative Effects

No direct effects are expected from Alternative 1 as no management activities would occur. Potentially, indirect effects may occur if this alternative were implemented (which would reduce the fire resiliency of the project area) and high-intensity wildfires occur that result in further loss of habitat for MIAs. The risk of high-intensity future fires would increase under this alternative when combined with ongoing fire suppression.

Effects Common to Alternatives 2 and 3

Direct, Indirect and Cumulative Effects

None of the identified habitats would change assemblage with the proposed prescribed burning under either action alternative. Low-intensity prescribed burns would affect all the assemblages present in the treatment areas but would not actually change the assemblage currently represented. Effects would be in the form of a reduction in duff and small- to medium-diameter woody debris; a reduction in older, decadent brush and brush skeletons, a reduction in the smaller trees and brush within the understory of mixed conifer stands; and possible opening of small pockets of overstory, though not to an extent that would alter the assemblage category.

Migratory Birds

Effects to migratory birds from the action alternatives are described in detail in the report titled “Migratory Landbird Conservation on the Shasta-Trinity National Forest” in the project record.

Alternative 1

Direct, Indirect and Cumulative Effects

No direct effects are expected from Alternative 1 as no management activities would occur. Potentially, indirect effects may occur if this alternative were implemented (which would reduce the fire resiliency of the project area) and high-intensity wildfires occur that result in further loss of habitat for migratory landbirds, at least in the short term. The

risk of high-intensity future fires would increase under this alternative when combined with ongoing fire suppression. See the Fire and Fuels discussion above.

Effects Common to Alternatives 2 and 3

Direct, Indirect and Cumulative Effects

Neither action alternative would adversely affect migratory landbird species or their associated habitats. Potential effects to migratory species would be minimized through project design, integrated design features and adherence to Forest Plan Standards and Guidelines such as for snags and down woody debris.

Soil, Geology and Watershed/Hydrology

Existing Condition Soil

Soils in the project area are predominantly mapped as metasedimentary. Smaller units are mapped as granitic or serpentine. Within the metasedimentary unit, pockets of granitics, limestone and serpentine soils exist. Soil textures vary but are mostly skeletal loams. Generally the soils range from shallow to moderately deep with little soil profile development and low to moderate soil productivity.

Most of the proposed treatment areas have been previously disturbed by wildfire. Calculated maximum erosion hazard ratings (EHR), which rates soil erodibility for 100 percent bare soil, are predominantly moderate to high. Soils in the western third of Quinby Creek Drainage have very high EHR.

The project area is steep, rugged terrain. Less than ten percent of the area is gently sloped, while almost a third of the project area has slopes exceeding 65 percent. Susceptibility to erosion and sediment delivery to a stream network increase with increasing slope. Particularly on steep slopes, ground cover is critical to keeping soil in place and preventing it from reaching the stream network.

Repeated wildfire within the project area has increased soil erosion, thereby reducing soil productivity. Hydrophobic soils, which exhibit water repellency and surface runoff in post burn sites, have been documented to occur in the project area as a result of past wildfire (USDA Forest Service 2000a). Hydrophobic soils, particularly in coarse granitic soils, may currently exist in the aftermath of more recent fires. The extent of impacts to soils from these fires is unknown.

Geology

The project area is a steep rugged landscape sculpted in large part by landsliding, primarily debris slides. While large, deep-seated landslides are uncommon relative to adjacent watersheds, the westernmost part of the project area is subject to shallow debris slides due to the presence of the sandy soil that develops on granitic rock.

Areas prone to landslides include inner gorges and seeps adjacent to draws. Drainages with a large number of recent debris flow tracks include Eagle, Slide, Eightmile, Twomile, and Virgin Creeks. Steep eroding headwalls, active and dormant debris slides, and inner gorges occur throughout the project area. Large recent wildfires (e.g., the

Backbone, Bake Oven and Megram Fires) consumed much of the vegetation and increased the potential for landslides.

Evidence of large shallow, rapid debris slides is visible in the headwaters of Eightmile (Section 17), Virgin, Eagle, and Slide Creeks. These landslides initiated debris flows and scoured long segments of the stream channels. The degree of revegetation apparent on the 1982 aerial photos indicates that the landslides probably occurred around the time of the 1964 flood. The largest is in Eightmile Creek, and it remains clearly visible on imagery from 2008. In the course of examining these aerial photos, it became apparent that many of the "active" debris slides identified in the GIS coverage of the project area are much older features, may be hundreds or even thousands of years old, and might be more aptly mapped as "headwall basins". This possibility is addressed in project design features (see project design features for Geology in Chapter 2).

Watershed/Hydrology

The project area is within the New River 5th field watershed, which is a tributary to the Trinity River. The New River watershed is identified as a Tier 1 Key Watershed in the Northwest Forest Plan. Tier 1 key watersheds serve as refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species; they also provide high quality water.

There are eight 7th field drainages within the New River watershed, as shown in Table 3.23 below and displayed in Figure F.16 in Appendix E.

Table 3.23. Project area drainages (HUC7).

Drainages (HUC7)	Acres
Eightmile Creek	6,954
North Fork Eagle Creek	7,696
Sixmile Creek-Virgin Creek	9,514
Eagle Creek-Slide Creek	10,056
Lower Slide Creek	8,254
Twomile Creek-Virgin Creek	7502
Barron Creek-Caraway Creek	5,401
Quinby Creek	2,975

Streams in the project area exhibit relatively steep gradient and are primarily sediment transport reaches. Riparian reserves are designated along stream channels, surface waterbodies and wetlands and are managed to provide benefits to riparian dependent species. While the Trinity River is listed as sediment impaired by the Environmental Protection Agency (EPA) under the Clean Water Act section 303d, the New River watershed and its associated drainages within the project area drainages are identified as reference[27] watersheds within the Trinity TMDL for sediment. Physical and biological conditions suggest that aquatic and riparian systems are mostly functional in terms of supporting dependent species and beneficial uses of water. Past management-induced

[27] Reference – or healthy - watersheds currently exhibit both high geomorphic, hydrologic and biotic integrity relative to their natural potential condition and a stable drainage network.

disturbance has not resulted in significant alteration of geomorphic, hydrologic or biotic processes or raised concerns for risks to those processes.

The Trinity River has historically been recognized as a major producer of Chinook and coho salmon and steelhead trout (see the Fisheries discussion below). Existing downstream beneficial uses for the New River are listed as municipal and domestic supply, agricultural supply, industrial service supply, industrial process supply, groundwater recharge, freshwater replenishment, navigation, hydropower generation, water contact recreation, non-contact water recreation, commercial and sport fishing, cold freshwater habitat, wildlife habitat, rare threatened or endangered species, migration of aquatic organisms and their spawning, reproduction, and/or early development.

Disturbance/Cumulative Watershed Effects

The drainages encompassing the project area are largely unroaded (see Figures 3.4 and 3.5 below for watershed boundaries). Existing hiking and recreation stock trails, while they cause localized impact to soils and water resources, have little effect at the watershed scale. Impacts from current and historical recreation, mining, grazing and hunting are limited in extent. The primary disturbance to soil and water resources within the project area is from wildfire and fire suppression efforts. As noted above in the Fire and Fuels discussion, current fuel conditions in the project area increase the risk of future intense fire behavior and adverse effects to resources.

Recent wildfires, particularly those resulting in large areas of moderate and high severity, have elevated the risk of landsliding and debris flows, soil erosion (and resulting loss of soil productivity), and transport of increased sediment to surface waters.

A cumulative watershed effects (CWE) analysis was performed using three quantitative models (see below). The existing condition was modeled for the year 2012 because the anticipated implementation of the project was in 2012; this would result in an additional year of recovery of disturbance from previous wildfires. In 2013, approximately 800 additional acres burned in the Corral Fire that overlapped into the project area and again in 2015 the River Complex burned an additional 725 acres. Overall, the soil burn severity within the project area was of low to moderate severity and low to moderate intensity, and did not result in any significant concerns to soil and water resources.

USLE (Universal Soil Loss Equation) Model

The USLE model predicts sediment delivery to streams from surface erosion. The risk ratio is the percent of predicted sediment over background values. Recovery from surface erosion is based on vegetation cover, and a faster recovery is assumed than in the GEO (mass wasting) and ERA (disturbance) models. Eightmile Creek and Sixmile Creek-Virgin Creek show the greatest potential for increased sediment delivery due to recent large, relatively high-severity fires in those drainages. All other 7th field drainages have a relatively low current risk ratio. See the project Soil/Geology/Hydrology Report.

GEO (Mass Wasting) Model

The GEO (mass wasting) model estimates sediment delivery to streams from mass wasting. Predicted sediment delivery is for the first decade following project completion. Results of the CWE modeling show that Eightmile Creek, Sixmile Creek-Virgin Creek,

North Fork Eagle Creek, and Quinby Creek all have predicted high sediment delivery risk. All of these drainages experienced large, relatively high-severity fires in the last decade. The model assumes no recovery for the first ten years, based on the assumption that stabilizing vegetation experienced a high percentage of mortality.

In this scenario, the loss of stabilizing vegetation is likely overestimated and reflects high values. Nonetheless, this analysis indicates the vulnerability of these drainages to mass wasting as a result of disturbance from wildfire. See the project Soil/Geology/Hydrology Report.

ERA (Equivalent Roaded Acres) Model

The ERA model tracks disturbances that affect watershed processes and provides an indicator of watershed condition. The model compares the current and proposed level of disturbance within four watershed scales, with a theoretical maximum disturbance level (threshold of concern [TOC]) for HUC5 and HUC6 watersheds developed by the Shasta-Trinity National Forest. The results of the ERA modeling indicate that the New River watershed is below the TOC for cumulative watershed effects with a low disturbance level. Analysis of the 6th field subwatersheds indicates that all three subwatersheds are below the threshold of concern. The Upper New River and Lower New River subwatersheds indicate a low level of disturbance. The Sixmile Creek subwatershed indicates a moderate level of disturbance as a consequence of recent relatively high-severity wildfire. See the project Soils/Geology/Hydrology Report for more information.

Analysis of the 7th field drainages indicates that current disturbance is low to moderate. Eightmile Creek and North Fork Eagle Creek drainages have the highest risk ratios. With the exception of Quinby Creek and Barron Creek-Caraway Creek, the drainages are roadless, and most disturbance is a result of wildfire.

Analysis of the 8th field subdrainages indicates that disturbance levels currently range from low to high. A total of 49 subdrainages were analyzed with the ERA model. Two subdrainages indicated high disturbance levels, twelve indicated moderate disturbances levels, and the remaining thirty-seven subdrainages indicated low disturbance levels. Areas with moderate and high disturbance were impacted by recent wildfires.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Soil

Because none of the proposed activities would occur under this alternative, there would be no direct effects. Indirectly, the no action alternative would allow developing litter layers to mature. Untreated, self-thinning stands would continue to contribute woody debris to the forest floor, allowing decomposition to continue and adding needed organics and soil wood to the soil profile.

The occurrence of a high-intensity wildfire would increase the potential for impacts to soils and soil productivity in severely burned areas, especially since the risk of soil erosion increases proportionally with fire intensity (Berg and Azuma 2010, Neary et al.

1999). Loss of soil cover would significantly increase erosion, thereby reducing soil productivity and increasing risk of water quality degradation from sediment. Other potential detrimental effects could include the loss of organics and nutrients and a reduction of water infiltration. Burns that create very high soil-surface temperatures, particularly when soil moisture content is low, result in an almost complete loss of soil microbial populations, woody debris, and the protective duff and litter layer over mineral soil (Hungerford et al. 1991, Neary et al. 2005). Nutrients stored in the organic layer (such as potassium and nitrogen) can also be lost or reduced through volatilization and as fly ash (DeBano 1991, Amaranthus et al. 1989).

Fire-induced soil hydrophobicity[28] is presumed to be a primary cause of the observed post-fire increases in runoff and erosion from forested watersheds (Huffman et al. 2001). Though hydrophobicity is a naturally-occurring phenomenon that can be found on the mineral soil surface, it is greatly amplified by increased soil burn severity (Doerr et al. 2000, Huffman et al. 2001 and Neary et al. 2005).

Soils experiencing hydrophobicity usually return to pre-burn conditions in no more than six years (DeBano 1981). Dyrness (1976) and others have documented a much more rapid recovery of one to three years (Huffman et al. 2001). The persistence of a hydrophobic layer depends on the strength and extent of hydrophobic chemicals after burning and the many physical and biological factors that can aid in breakdown (DeBano 1981). This variability means that post-fire impacts on watershed conditions are difficult to predict and to quantify.

If hydrophobic soils result from a severe, high-temperature fire, moderate to high surface erosion could occur. The potential for mass failures would be low to moderate because of the overall landtype characteristics within the project area; however, localized slope movement could occur, especially along roads on steeper mountain slopes.

Geology

No direct effects on geologic features within the project area would occur under this alternative. However, as noted above, this alternative would increase the risk of a severe wildfire. Indirectly, a wildfire under severe fire conditions (90th percentile) would burn a large proportion of the project area with flame lengths in excess of 8 feet as displayed in the Current flame length potential map (Appendix F Figure F.8.). Model outputs estimate that about 2,698 acres of geologically sensitive land types (active slides, inner gorge, and slopes > 65%) would burn with flame lengths in excess of 8 feet.

Watershed/Hydrology

No direct effects on watershed/hydrologic function within the project area would occur under this alternative. However, as noted above, this alternative would allow the risk of a severe wildfire to increase. The occurrence of such a fire would increase the potential for impacts to hydrologic systems in severely-burned watersheds. Increased volume of sediment delivered to the stream network would occur. Increased sediment delivery would in turn likely increase turbidity.

[28] Hydrophobic soils associated with fires occur when hydrocarbon residue created after organic material is burned soaks into empty pore spaces in the soils, making them impervious to water and resulting in accelerated runoff.

Increased sediment delivery from surface erosion would likely peak the first year after the event and then recover gradually over the next six to ten years. Sediment delivery from mass wasting would persist for longer periods until stabilizing vegetation could recover. Increased sediment delivery to channels is a concern in the New River watershed, as the antidegradation provisions of the Clean Water Act and Basin Plan prohibit an "increase in pollution."

Increased stream temperature resulting from reduced shade is also a concern if high-severity, stand-replacing wildfire occurs within riparian reserves. These highly productive areas can develop heavy fuels loads capable of supporting stand replacing crown fires that can alter wildlife habitat, ecosystem function, and contribute to channel erosion (Van de Water and North 2010).

Changes in site evapotranspiration demands, interception of precipitation by vegetation, and reduced soil infiltration would result in great runoff, decreased lag time, and increased peak flows. Higher peak flows would increase the likelihood of increased channel and bank scour. If stabilizing bank vegetation and coarse woody debris were also reduced by high-severity fire, streambank stability would likely decrease.

Cumulative Effects

Wildfire will almost certainly occur within the project area during the next three decades, the timeframe for which most modelled cumulative disturbances are considered to recover to extent feasible. The severity and size of those fires would determine the cumulative watershed effects of the no action alternative. Increased risk of high-severity fire exists under the no action alternative because of current fuel loading from previous suppression efforts, changed conditions from many decades of fire suppression, and a continued policy of fire suppression. Fire modeling produced scenarios under the no action alternative that would result in increased surface erosion, mass wasting, and percent ERA. Modeling results indicated that, in the event of another large wildfire, many drainages in the project area would likely exceed the threshold of concern for downstream beneficial uses.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Soil

The proposed prescribed fire would result in a minor loss of nitrogen, but this would have no measurable effect on soil productivity. The overall forest floor would be adequately maintained. The prescribed fuel treatment is designed to meet forest soil ground cover requirements in treated areas. The maintenance of groundcover would not result in detrimental increases in surface erosion. Isolated pockets of soil may exist that do not currently meet forest groundcover requirements. These areas would be unlikely to burn under the prescription and should not be further impacted.

Geology

The direct effects of the prescribed burn would be predominantly low vegetation severity fire which would kill only small understory vegetation and leave the bulk of the soil

cover. Flame lengths would predominantly be less than 8 feet, and the fire model estimates that flame lengths > 8 feet would occur on about 650 acres of geologically sensitive land (active slides, inner gorge, and slopes > 65%). Mitigation measures to avoid high severity on active slides and slide prone areas would be applied as part of the project design criteria. The single known cave in the project area is not located within a treatment area.

No vegetation disturbance is anticipated within 1000 feet of any known cave or marble outcrops. The distance from the only known cave to the nearest prescribed fire area is approximately one mile. The distribution, concentration, and persistence of the smoke produced is not currently predictable and would depend on air currents. Wildfire and smoke are part of the natural environment, and such smoke would not be alien to the cave or karst area.

Foot traffic on trails and soil disturbance on fire lines would occur as part of the prescribed burning and would produce dust if done under dry conditions. The total length of trails in ultramafic rock, which might be used by crews is about 6.8 miles, and total length of fire line is about 5.6 miles. Resource protection measures would mitigate dust production.

Watershed/Hydrology

The prescribed fire would be primarily a mosaic of low-intensity fire and unchanged vegetation. Small areas of moderate- and high-intensity fire would occur. Short-term increases in surface erosion would likely occur in some areas; however, the increase would not cause downstream impacts to beneficial resources. Trends in sediment delivery over time would be toward background levels. The low-intensity fire treatments would not affect canopy cover in riparian reserves; therefore changes in stream temperature are not anticipated.

Short-term increases in turbidity and pH are possible after the initial post-implementation precipitation events produce runoff. Increases in turbidity and pH would be difficult to detect and would not be anticipated to impact downstream beneficial uses.

Cumulative Effects

Figure 3.5 below illustrates existing disturbance levels at four watershed scales and the predicted changes under Alternative 2.

Results of the surface model analysis show that the largest change in risk is 17 percent in the North Fork Eagle Creek drainage, and the overall highest risk of 23 percent is in the Twomile Creek – Virgin Creek drainage (which would approach but would not exceed the Trinity River TMDL of 25 percent over background).

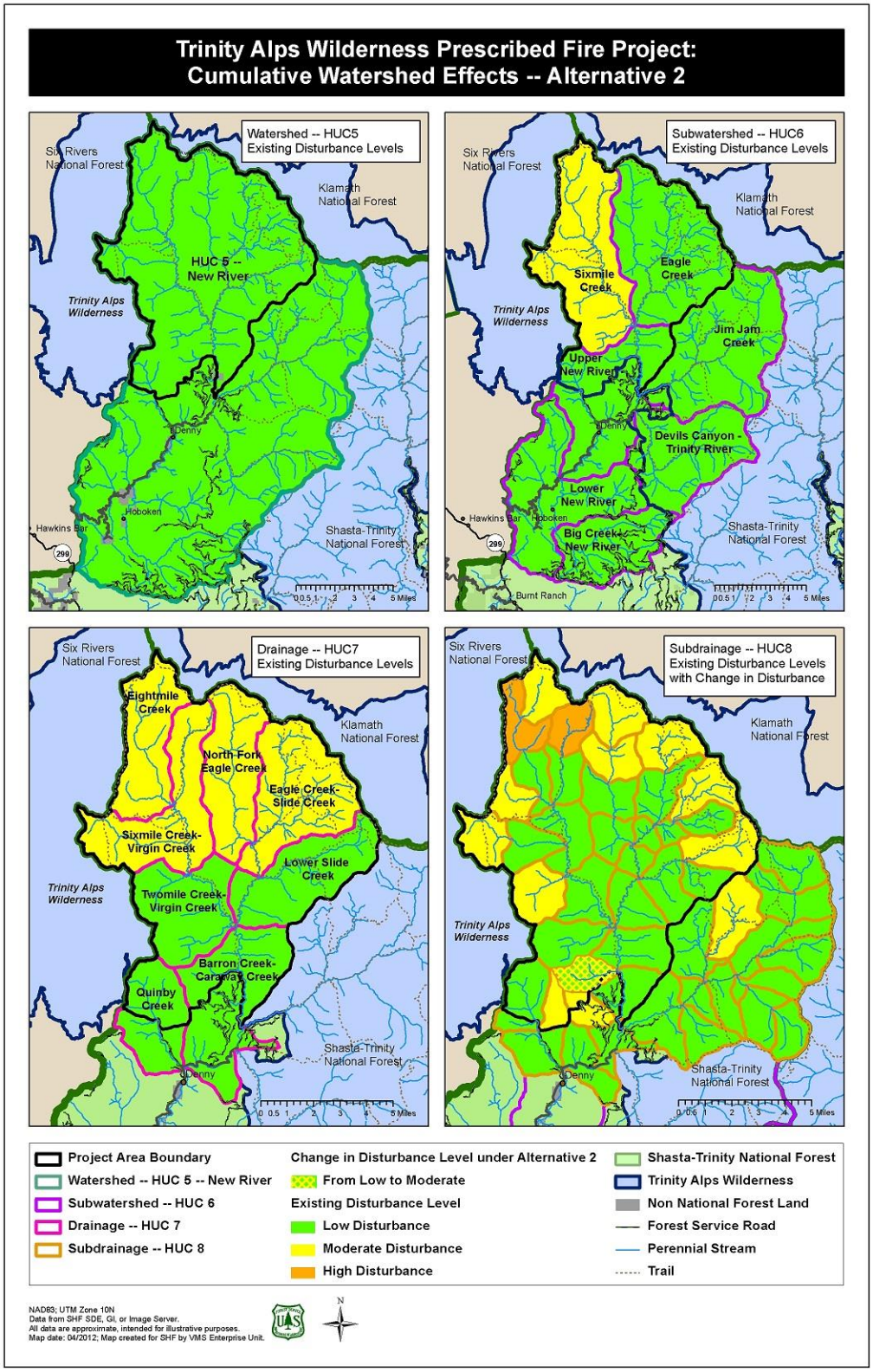


Figure 3.5. Cumulative watershed effects under Alternative 2 at the HUC 5, 6, 7 and 8 levels.

Based on predicted fire intensity and vegetation severity associated with implementation of this alternative (see the Fire, Fuels and Vegetation discussions above), recovery from initial increases in surface erosion would be realized substantially in the first year, and then continue to trend toward background levels over the next few years.

The increase in sediment delivery from mass wasting as a result of the proposed treatments would be negligible. The ERA model shows very little increase in disturbance levels. The most noticeable changes to the predicted risk ratio are seen in individual 7th field drainages (HUC7) and 8th field subdrainages (HUC8). One subdrainage (HUC8) within the Barron Creek - Caraway Drainage would change from a Disturbance Level of Low to Moderate. Disturbance that could result in short-term increases to sediment would be localized; the effects would dissipate downstream with increasing stream order. The proposed treatments would not – and are not designed to – prevent wildfire from occurring within the project area in the next decade. However, the likelihood of smaller and/or lower-severity wildfires is greater than if the proposed treatments were not implemented. The resulting cumulative watershed effects from future wildfires of lower severity would be less likely to impact downstream beneficial uses.

Alternative 3 – Additional Treatment Areas

Direct and Indirect Effects

Soil

Although this alternative would treat more acres than Alternative 2, the effects of the two action alternatives would be very similar with regard to soil disturbance and changes in soil nutrients. The additional treatments in the Virgin Creek drainage would enhance the effectiveness of Alternative 2 treatments (see the Fire and Fuels discussion above).

Geology

The effects of the two action alternatives would be very similar in that neither would result in increased mass wasting beyond the existing condition. CWE landslide model results are nearly identical for Alternatives 2 and 3.

Watershed/Hydrology

The effects of the two action alternatives would be very similar with regard to short-term increases in surface erosion, turbidity and pH, sediment delivery and stream temperature – all of which would be difficult to detect and would not be expected to impact downstream beneficial uses.

Cumulative Effects

Figure 3.6 below illustrates existing disturbance levels at four watershed scales and the predicted changes under Alternative 3.

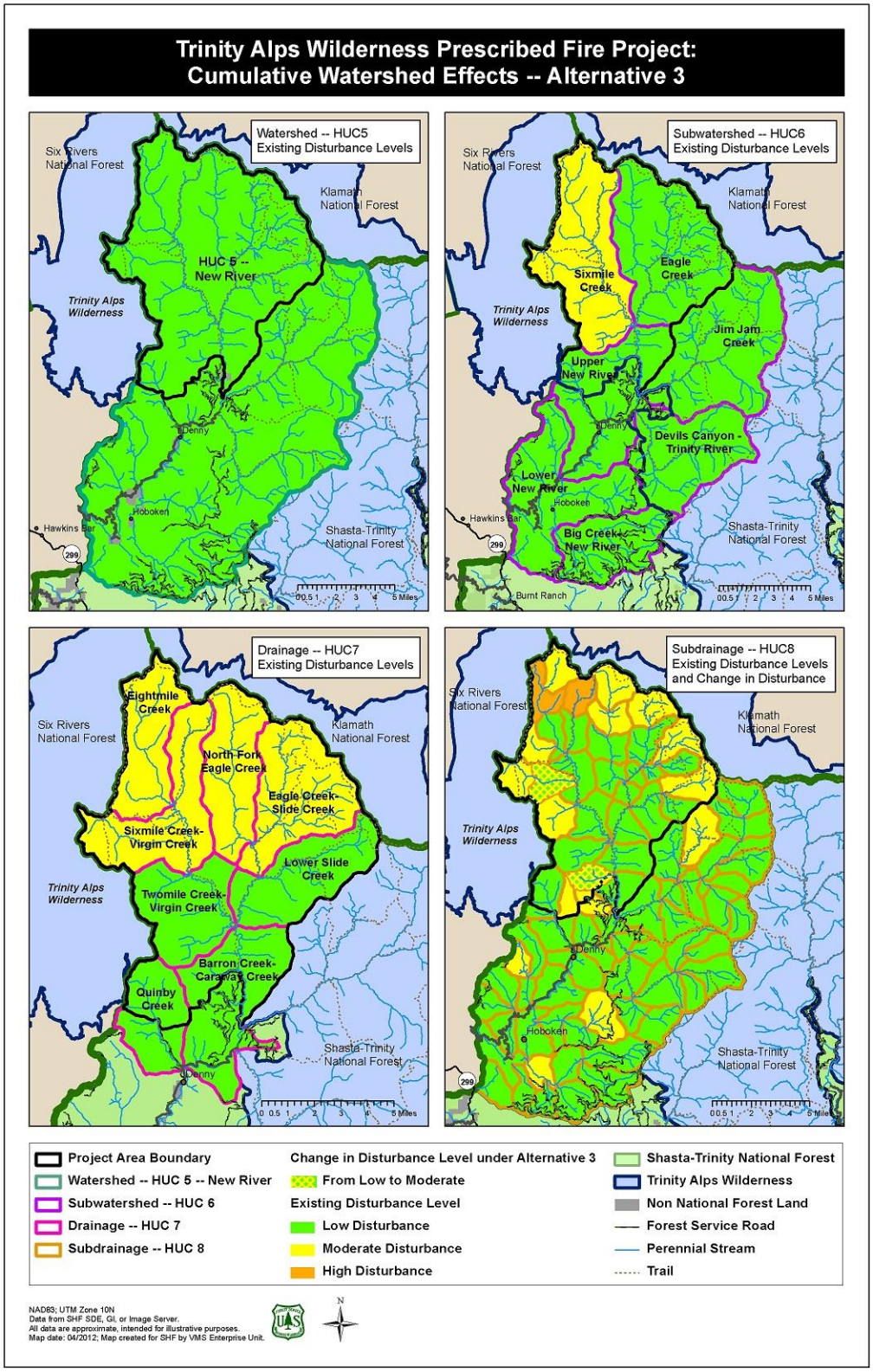


Figure 3.6. Cumulative watershed effects of Alternative 3 at the HUC 5, 6, 7 and 8 levels.

The cumulative watershed effects modeling results of the proposed treatments for alternative 3 are displayed in the project Soil/Geology/Hydrology Report. Results of the surface model analysis show that the largest change in risk is 17 percent in the North Fork Eagle Creek drainage, and the overall highest risk of 25 percent is in the Twomile Creek – Virgin Creek drainage; this is the largest acceptable increase that still meets TMDL objectives. As with Alternative 2, recovery from initial increases in surface erosion would be realized substantially in the first year, and then continue to trend toward background levels over the next few years.

The increase in sediment delivery from mass wasting as a result of the proposed treatments would be similar to that under Alternative 2. The ERA model shows very little increase in disturbance levels, the most noticeable changes being to the predicted risk ratio in individual 7th field drainages and 8th field subdrainages. Disturbance that could result in short-term increases to sediment would be localized; the effects would dissipate downstream with increasing stream order.

As with Alternative 2, the resulting cumulative watershed effects from wildfire of lower severity would be less likely to impact downstream beneficial uses than if the treatments were not implemented. The long-term risk of cumulative impacts from wildfire would be slightly less under Alternative 3 than Alternative 2 because fuel accumulations would be reduced on more acres.

Fisheries

The following aquatic species and their habitats in the New River watershed have special status under the ESA or are given special management consideration as Forest Service Sensitive species or Management Indicator Species (MIS) assemblages.

Endangered:	None
Threatened:	Southern Oregon Northern California Coast (SONCC) coho salmon
Critical Habitat:	SONCC coho salmon
Proposed:	None
Sensitive anadromous fish:	Upper Klamath/Trinity (UKT) and Upper Trinity River (UTR) Chinook salmon and Klamath Mountain Province (KMP) steelhead, Pacific lamprey
Essential Fish Habitat:	SONCC coho salmon; UKT and UTR Chinook salmon
Sensitive aquatic species:	California floater, montane peaclam, nugget pebblesnail, scalloped juga, black juga, kneecap lanx, hardhead and McCloud River redband trout

MIS assemblages	Anadromous fish assemblage (summer- and winter-run steelhead trout and spring-run Chinook salmon) and coldwater inland fish assemblage (rainbow trout)

In the analysis area, Southern Oregon Northern California Coasts (SONCC) coho salmon (*Oncorhynchus kisutch*) and their designated critical habitat occur in the New River and its tributaries (see Figure F.17 in Appendix F). The effects of the action alternatives to freshwater Essential Fish Habitat (EFH) for coho and Chinook salmon in the New River and its tributaries were also analyzed.

Pacific lamprey habitat conditions are similar to aquatic habitat conditions necessary for survival and recovery of the threatened SONCC coho salmon, and the long term viability of upper Klamath/Trinity (UKT) Chinook salmon-spring run, upper Trinity River (UTR) Chinook salmon-fall run and Klamath mountain province (KMP) steelhead trout. Pacific lamprey are also assumed to be distributed in the same stream reaches within the analysis area as KMP steelhead trout.

The project area was determined to be outside the range of the following sensitive aquatic species. No effect to the following species or their habitats would occur from implementation of any of the alternatives: California floater, montane peaclam, nugget pebblesnail, scalloped juga, black juga, kneecap lanx, hardhead, and McCloud River redband trout. See the Supplemental Aquatic Species Biological Evaluation in the project record for more detailed information about these species.

Existing Condition as noted above in the Watershed/Hydrology discussion, the New River watershed – in which the project area is located – is a Tier 1 Key Watershed that provides refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species.

Table 3.24 below displays the stream miles of anadromous fish habitat and, therefore, the extent of SONCC coho salmon critical habitat within the project area by 7th-field watershed. These figures are likely overestimated because the distribution of steelhead[29] was used as the basis for analysis of potential effects on all salmonids and their habitat and to determine the extent of critical habitat for SONCC coho salmon. As a result, the effects analysis for these species represents a conservative approach to determining the actual effects of the action alternatives. The table also displays the extent of rainbow trout habitat, which occurs in all anadromous fish habitat and, in several subwatersheds, beyond the range of anadromous fish.

[29] Summer and winter-run steelhead have similar habitat and biological requirements and are addressed collectively as "steelhead".

Table 3.24. Stream miles of anadromous fish habitat / Coho Salmon Critical Habitat and rainbow trout habitat by subwatershed.

7th Field Watersheds	HUC	Miles of Coho Salmon Critical Habitat	Miles of Additional Rainbow Trout Habitat
Eightmile Creek	18010211100101	2.9	2.7
Sixmile Creek-Virgin Creek	18010211100102	8.0	0.6
Lower Slide Creek	18010211100203	8.7	0.0
Twomile Creek-Virgin Creek	18010211100103	9.5	0.0
Barron Creek-Caraway Creek	18010211100402	5.0	0.0
North Fork Eagle Creek	18010211100201	0.7	3.9
Eagle Creek-Slide Creek	18010211100202	6.0	1.8
Quinby Creek	18010211100401	0.0	0.5
		40.8	**9.5**

Repeated occurrences of recent high severity wildfire within the project area have increased soil erosion and reduced soil productivity. Steep eroding headwalls, active and dormant debris slides, and inner gorges occur throughout the project area. The Trinity River is listed as sediment impaired by the Environmental Protection Agency (EPA) under the Clean Water Act section 303d. Drainages within the project area are included in the TMDL. See the Soil, Hydrology and Geology discussion above for more detail.

Baseline Conditions for Habitat Indicators in the Watershed and Project Area

Existing baseline conditions for the New River watershed and for project area 7th-field watersheds were summarized based on an analysis of watershed indicators (see Tables 3.25-3.27 below).

Table 3.25. Baseline conditions for Habitat Indicators in the New River 5th-field watershed.

Ranking	Properly Functioning	At Risk	Functioning at Unacceptable Risk
Baseline Indicator	Temperature Sediment/Turbidity Chemical/Nutrients Physical Barriers Substrate and Embeddedness Pool Frequency & Quality Large Pools Refugia Width/Depth Ratio Stream Bank Condition Peak/Base Flows Drainage Network Increase Disturbance History Riparian Reserves	Large Woody Debris Off-Channel Habitat Floodplain Connectivity Disturbance Regime	

Table 3.26. Baseline conditions in North Fork Eagle Creek, Eagle Creek-Slide Creek, and Lower Slide Creek 7th-field watersheds.

Ranking	Properly Functioning.	At Risk	Functioning at Unacceptable Risk
Baseline Indicator	Temperature Sediment/Turbidity Chemical/Nutrients Physical Barriers Substrate and Embeddedness Pool Frequency & Quality Large Pools Refugia Width/Depth Ratio Stream Bank Condition Peak/Base Flows Drainage Network Increase Disturbance History Riparian Reserves	Off-Channel Habitat Floodplain Connectivity Disturbance Regime	Large Woody Debris

Table 3.27. Baseline conditions in Eightmile Creek, Sixmile Creek-Virgin Creek, Twomile Creek-Virgin Creek, Barron Creek-Caraway Creek, and Quinby Creek 7th-field watersheds.

Ranking	Properly Functioning.	At Risk	Functioning at Unacceptable Risk
Baseline Indicator	Temperature Sediment/Turbidity Chemical/Nutrients Physical Barriers Substrate and Embeddedness Pool Frequency & Quality Large Pools Refugia Width/Depth Ratio Stream Bank Condition Peak/Base Flows Drainage Network Increase Disturbance History Riparian Reserves	Large Woody Debris Off-Channel Habitat Floodplain Connectivity Disturbance Regime	

Proximity of Anadromous Fish to Proposed Treatment Areas

The proximity to anadromous fish distribution varies by treatment area, and is a common variable discussed throughout the effects analysis. Stream distances from anadromous fish distribution to the closest treatment area boundary for each proposed prescribed burn area are displayed in Tables 3.28 and 3.29 below, along with acres of riparian reserves. Figure F.17 in Appendix F displays anadromous fish species' range. All treatment areas except for Salmon Summit to Election Gap and Salmon Summit to Fawn Ridge propose prescribed fire to back into riparian reserve areas adjacent to anadromous fish habitat.

Table 3.28. Proximity of treatment areas to anadromous fish habitat – Alternative 2.

Treatment Area	Acres of Treatment Area*	Acres of Treatment Area in Riparian Reserves	Closest Proximity of Treatment Area to Anadromous Habitat
Salmon Summit to Election Gap	1,680	212	0.5 miles
Election Gap to New River	1,202	220	Adjacent to habitat
Salmon Summit to Fawn Ridge	2,020	442	0.75 miles
Megram	9,619	2,676	Adjacent to habitat
Barron Creek	2,163	499	Adjacent to habitat

* Actual total proposed treatment acres under Alternative 2 are 16,709 – the discrepancy is due to the nature of the hydrologic unit data layer as it overlays the project area.

Table 3.29. Proximity of treatment areas to anadromous fish habitat – Alternative 3.

Treatment Area	Acres of Treatment Area*	Acres of Treatment Area in Riparian Reserves	Closest Proximity of Treatment Area to Anadromous Habitat
Salmon Summit to Election Gap	1,680	212	0.5 miles
Election Gap to New River	1,202	220	Adjacent to habitat
Salmon Summit to Fawn Ridge	2,020	442	0.75 miles
Megram	9,619	2,676	Adjacent to habitat
Barron Creek	2,163	499	Adjacent to habitat
Twomile Ridge*	1,091	231	Adjacent to habitat
Sixmile Ridge*	524	86	Adjacent to habitat
Soldier Ridge*	765	140	Adjacent to habitat

* Actual total proposed treatment acres under Alternative 3 are 19,088 – the discrepancy is due to the nature of the hydrologic unit data layer as it overlays the project area.

Environmental Consequences

Habitat Indicators Dropped from Further Analysis

The following habitat indicators were dropped from detailed analysis of effects for fisheries:

Habitat Access – Physical barriers: Neither action alternative would alter anadromous fish migration or alter current fish access by creating or removing physical instream barriers;

Habitat Elements – Off-channel habitat and channel condition and dynamics – Floodplain connectivity: Floodplains and off-channel habitat areas are not a significant component in the mountainous, high gradient, transport stream reaches that occur in the analysis area. Neither action alternative would change channel transport capabilities or change the number of road-stream crossings, a primary factor in loss of floodplain connectivity. Neither action alternative would cause excessive channel scour or stream channel downcutting or not alter stream channel stability, channel shape, erosive energy, or reduce channel roughness through loss of large wood or loss of large size class substrate (cobble or larger).

Channel Condition and Dynamics– Average Wetted Width/Max Depth Pools and Streambank Condition: Neither action alternative would change the functional condition of stream channels or alter channel morphology or streambank stability.

Flow/Hydrology – increase in drainage network: Neither action alternative would increase road or trail lengths, add ditches, cause compaction or increase active channel lengths.

Watershed – road density and location: Neither action alternative would change road or trail densities or locations from current conditions.

Habitat Indicators Analyzed for this Project

Direct and Indirect Effects

Alternative 1

Because no activities would occur under this alternative, no direct effects to anadromous fish or fish habitat would occur. The potential for indirect effects to fish and fish habitat components is related to the likelihood of future large, high-severity wildfires. Adverse effects of a wildfire would include creation of hydrophobic soils, post-fire increased soil erosion, increased water runoff, decreased lag time, and increased peak flows. These conditions result in disrupted channel maintenance processes, increased sediment delivery to stream channels and degraded aquatic habitat through pool filling, loss of spawning habitat and poor water quality.

Post-fire sedimentation would likely be chronic until vegetation and soil recovery occurred. Widespread removal of riparian reserve vegetation from a high severity fire would reduce future large wood recruitment, reduce stream shade and increase stream water temperatures until riparian vegetation was re-established.

Effects Common to Alternatives 2 and 3

No project activities would occur in live streams or in the New River. In order to prevent the possibility of direct harm to all life stages of anadromous fish individuals by crushing, resource protection measures restrict project-related field personnel from entering anadromous waterways from October 15 through April 15. Because no activities are proposed within stream channels that are accessible to anadromous salmonids, neither action alternative would have direct effects on coho salmon, Chinook salmon or steelhead, or their habitat components.

The following indirect effects to the habitat indicators discussed above would be expected from implementation of either action alternative (see Table 3.30 below):

Table 3.30. Summary of effects for Alternatives 2 and 3 on anadromous fish and their habitat.

Indicator	Prescribed Fire Treatments	Existing Fire Line Maintenance	Danger Tree Removal
Temperature	0	0	0
Suspended Sediment / Turbidity	-/+	0	0
Chemical Contamination / Nutrients	0	0	0
Physical Barriers	0	0	0
Substrates / Embeddedness	-/+	0	0
Large Woody Debris	0	0	0
Pool Frequency and Quality	0	0	0
Large Pools	0	0	0
Off-channel Habitat	0	0	0
Refugia	0	0	0
Average Wetted Width / Maximum Depth pools	0	0	0
Streambank Condition	0	0	0
Floodplain Connectivity	0	0	0
Peak/Base Flows	0	0	0
Drainage Network	0	0	0

Indicator	Prescribed Fire Treatments	Existing Fire Line Maintenance	Danger Tree Removal
Road Density/Location	0	0	0
Disturbance History	0	0	0
Riparian Reserves	0	0	0

Notes:
- Minor negative effect
0 Neutral effect
+ Long-term positive effect
-/+ Insignificant short-term negative effect followed by long-term positive effect

Cumulative Effects

Alternative 1

Under the no action alternative, cumulative effects are related to the likelihood of future large, high-severity fires, which would increase when no action combined with ongoing fire suppression results in continued accumulation of untreated fuels. Repeated large, severe wildfires would likely perpetuate elevated sedimentation and degradation of riparian habitat as described above under Direct and Indirect Effects for this alternative.

Effects Common to Alternatives 2 and 3

The potential for either action alternative to contribute to adverse cumulative effects is considered low, as the duration of potential effects – in particular sedimentation – to instream and riparian habitat is expected to be short-term and discountable. The eight 7th field watersheds within the project area show either minor or no increases in risk ratios from the proposed prescribed fire and values would remain well below threshold (refer to the Cumulative Watershed Effects discussion above). The minor increase is expected to be short-term until vegetation recovery occurs. In addition, the proposed treatments would be expected to reduce the severity of effects of a future wildfire, should it occur, and future cumulative effects from fires in these watersheds.

Overall, implementation of either action alternative would help maintain the health of forested ecosystems by increasing watershed health and thereby reducing the risk of sedimentation into stream channels, lowering the risk of watershed impacts associated with stand-replacing fire including surface erosion, landsliding, loss of riparian vegetation, channel sedimentation, and altered flow regimes.

Determination of Effects to Federally Listed Species and Critical Habitat

Based on the above analysis and incorporation of design features described in Chapter 2, either action alternative "may affect, but is not likely to adversely affect", SONCC coho salmon or designated Critical Habitat for coho salmon. Rationale for this determination is summarized as follows:

- Wildfire is a natural watershed disturbance in the project area. Consideration of the natural fire regime indicates that wildfire is likely in the near future. Continued unmanaged wildfire in the project area is likely to imperil watershed resources. Prescribed fire treatments are expected to help protect aquatic ecosystems from potentially severe effects of future wildfire.
- SONCC coho salmon have evolved in the context of natural fire regimes and associated watershed conditions.
- There would be no direct impacts to SONCC coho salmon.
- Either action alternative would cause short-term low magnitude increases in stream sediment during high flow events for up to 3 years following prescribed burning activities. These levels are discountable and are not expected to adversely affect SONCC coho ability to spawn, forage or rear in the project area.
- Because the project would be implemented within a 10-year period and the proportion of any 6th-field watershed treated with prescribed fire would be limited to no more than ten percent per year, associated watershed effects would be distributed over space and time.

Determination of Effects to USFS Sensitive Anadromous Fish Species

The project design features described in Chapter 2 apply to both action alternatives and would minimize or prevent adverse effects on anadromous salmonids and Pacific lamprey and their habitat at the site scale and minimize effects on these species downstream at the 7th- and 5th-field watershed scales and in the New River. A trend toward listing under the ESA is not anticipated, and viability is not at risk because:

- Short-term effects on aquatic habitat would be minor,
- Neither action alternative would negatively affect anadromous fish habitat in the long term.

Fisheries Management Indicator Species (MIS)

Alternative 1

There would be no direct effects to fish species or aquatic habitat under the no action alternative. Watershed and aquatic habitat conditions would continue to respond to climatic and other environmental changes and would continue to recover from past flood and fire events until reset by future natural events such as wildfire. There would be no direct effects to fish habitat components including stream shade, water temperature, sedimentation rates or large woody debris.

The no action alternative may cause indirect effects to fish and their habitat because the project area would be at a higher risk of high-severity wildfire. If such a wildfire occurred, it could have adverse impacts to watersheds and streams. Adverse effects of a wildfire would include creation of hydrophobic soils, post-fire increased soil erosion, increased water runoff, decreased lag time, and increased peak flows. These conditions result in disrupted channel maintenance processes, increased sediment delivery to stream channels and degraded aquatic habitat through pool filling, loss of spawning habitat and poor water quality.

Post-fire sedimentation would likely be chronic until vegetation and soil recovery occurred. Widespread consumption of riparian reserve vegetation from a high severity fire would reduce future large wood recruitment, reduce stream shade and increase stream water temperatures until riparian vegetation was re-established.

Alternatives 2 and 3

Activities proposed under Alternatives 2 and 3 are not expected to introduce measurable instream fine sediment into perennial stream reaches where Chinook salmon, steelhead and rainbow trout occur. Baseline conditions for all instream habitat elements would be maintained including substrate character, embeddedness, pool frequency, pool quality, width to depth ratio, and streambank condition.

There are no expected measurable changes to physical channel or habitat conditions from the activities proposed in either of the action alternatives including water quality, flow hydrology, and riparian reserve function. The long-term trend would be a slight improvement in overall riparian and aquatic conditions in the action area because of the reduced threat of high severity wildfire in the watershed.

Although implementation of either action alternative would result in slight changes to components of assemblage habitats such as substrate and turbidity, project area streams would continue to provide the same quantity and distribution of fisheries indicator assemblage habitats post project. Therefore, neither action alternative would likely result in any meaningful change to population trends and habitat availability for Chinook salmon, steelhead or rainbow trout.

Recreation, Scenery and Wilderness Values

Existing Condition

Recreation

The project area has limited recreational use compared to that of other areas of the wilderness due to its remote nature and rugged terrain. The main recreational use is hunting – mainly occurring during deer season (late September to early November). Minor amounts of fishing, gold panning, and some hiking occur; however, use is sparse. Recent trail work has opened several miles of previously inaccessible trails within the project area, and use of these trails for hiking and backpacking could increase (Sorochtey 2011 personal communication). In accordance with the Wilderness Act of 1964, no motorized vehicle use is allowed in wilderness; thus, no designated OHV routes or trails exist within the project area. Unauthorized OHV use is not reported to be an issue due to the remote nature and extreme terrain of the project area.

As directed by the Forest Plan (page 4-34), management of recreation in the Trinity Alps Wilderness emphasizes dispersed recreation, and recreational settings are managed to generally achieve primitive Recreation Opportunity Spectrum (ROS) conditions.

Figure F.18 in Appendix F displays recreational features within the project area.

Scenery

Although there are no sensitive travel corridors within the project area, the Trinity Alps Wilderness has a Sensitivity Level 1 − the highest sensitivity level − due to its designation as a wilderness area (USDA Forest Service 1974). Additionally, it carries the VQO of Preservation, which corresponds to the scenic integrity level of Very High.

The project area currently meets the assigned VQO and is characterized by a mixture of scenic variety and attractiveness classes. Some areas, particularly along Virgin Creek, are scenic attractiveness Class A – Distinctive and have a scenic integrity level of Very High. Other areas would be Class B (Typical) or even C (Indistinctive). A mixture of variety classes (distinctive, common and minimal) can also be found (Joyce 2011 personal communication). However, several visual components in the project area have also been negatively affected by past fire suppression efforts. Fire lines established during previous wildfires altered trail width and vegetation in some areas, essentially degrading the visual quality of the trails. For example, portions of the Salmon Summit to Fawn Ridge ridgeline burned in the 2009 Backbone Fire. Much of the area has a high density of large snags and fuel loading where the Backbone Fire did not burn but where suppression line was constructed (see Figure 1.2 above).

Additionally, although fire is a natural component of the Alps ecosystem, recent extreme fire behavior - compared to that of historical conditions - has resulted in large expanses of severely burned vegetation (see the project Fire and Fuels report); this condition is generally considered undesirable from a scenery perspective.

Adjacent Communities

There are considerable concerns within communities adjacent to the project area regarding the potential direct (e.g. loss of homes, air quality/public health issues, threats to domestic water supplies) and indirect (e.g. loss of income due to decreased tourism in the area) impacts from fire. There have been a number of large fires in the project area − Megram Fire (1999), Bake Oven Fire (2006) and Backbone Fire (2009) − that burned for long periods resulting in poor air quality (hazardous conditions), thus decreasing tourism or recreation in the area[30] as well as necessitating the evacuation of residents.

Wilderness Values

The Forest Plan Appendix Q (USDA Forest Service 1995a) and the Trinity Alps Wilderness Management Plan Draft Environmental Impact Statement (DEIS) (USDA Forest Service 1995d) identify four Wilderness Opportunity Classes (Pristine, Primitive, Semi-primitive, and Transition) for the Shasta-Trinity National Forest. Opportunity classes are hypothetical descriptions of conditions that are most likely to be developed, maintained, or restored within the wilderness. The project area is within the DEIS recommended 'Pristine' class, which is characterized by an unmodified natural environment, opportunities for isolated and solitary experiences, and a management objective of sustaining and enhancing natural ecosystems. The portion of the wilderness that the project area encompasses, however, has had major modifications via wildland fires and associated fire suppression activities.

[30] Sorochtey 2011 personal communication.

Although the Trinity Alps Wilderness contains portions of many grazing allotments, there are none within the project area. The Trinity Summit and Forks range management units are adjacent to the project area west of the Salmon Summit to Fawn Ridge treatment area and north of the Election Gap to Salmon Summit treatment area, respectively.

Environmental Consequences

Alternative 1 - No Action

Direct and Indirect Effects

Under Alternative 1, there would be no direct effects to recreation, scenery, socio-economics, or wilderness values. However, implementation of this alternative could have indirect effects as described below.

Recreation

Continued growth of understory vegetation could further limit access to trails and rivers, thus reducing opportunities for hunting, fishing, hiking, etc. In the event of a large-scale, high-severity wildfire, periods of hazardous air quality and/or trail and road closures would be likely, could be protracted, and could reduce recreational opportunities or degrade the recreational experience in the project area.

Scenery

Alternative 1 would perpetuate a forest condition of dense vegetation, and would meet the VQO of Preservation. This condition would have low visual diversity and would also inhibit the sight distance of the viewer, thus resulting in a less interesting visual experience. This alternative would not address high fuel levels, and would therefore also increase the susceptibility of the area to large-scale, high-severity fire (see the Fire and Fuels discussion above). Such a fire could result in a visually undesirable condition of large expanses of charred or dead trees, denuded vegetation, and residual debris. These visual effects could persist perhaps for decades, until the forest overstory in the affected areas regains dominance over understory vegetation.

Additionally, in the event of a large-scale fire, impacts to scenery from protracted periods of smoke and poor air quality would be short-term and moderate- to- major. Persistent temperature inversions during times of atmospheric stability that trap smoke over large areas (as in the 1987, 1999 and 2008 wildfires) would limit middle ground and background views.

Socio-economics

The no action alternative could result in an increased susceptibility to high-severity fires, which may indirectly decrease tourism in the larger area –thus negatively impacting the local businesses that rely upon financial input from visitors. Decreased use of the project area, however, would likely result in little-to-no effect on revenue due to the limited current use. Implementation of the no action alternative would also mean that no potential revenues to local communities from employment opportunities associated with project implementation would be realized (e.g. increased consumer activity from implementation staff, contracting needs for specific equipment such as helicopters, etc.).

Wilderness Values

As no proposed management activity would occur the no action alternative would be consistent with the Wilderness Act of 1964. As noted above, the no action alternative would increase the susceptibility to high-severity fires within the project area. In the event of such a fire, noise disturbance would temporarily increase in the project area due to suppression equipment operation (e.g. helicopters, chainsaws, etc.). Smoke disturbance would also likely affect the project area. These disturbances would negatively impact wilderness values, and use of the area may temporarily decline during and immediately following such an event. Conversely, the decline in use of the project area would enhance the solitary wilderness experience for those visitors who do use the area (upon re-opening of trails), as fewer encounters with other visitors would occur.

Cumulative Effects

Trail maintenance is the only management activity located within proximity to the project area which could contribute to cumulative effects. Past wildfire events have influenced the area and are considered part of the baseline condition. Potential future wildfires are not planned management activities and their specific effects are not known, these potential wildfires are not considered in cumulative effects analysis. The cumulative effects analysis is bound geographically by the Trinity Alps Wilderness, and considers a time frame of fifteen years beyond project implementation, at which time vegetation re-growth should obscure the visual evidence of project implementation.

The no-action alternative would not result in any direct effects, but has an indirect effect of continued vegetation biomass accumulation and susceptibility to wildfire. Combined with the direct and indirect effects of future trail maintenance activity the project's indirect effect would not be significantly altered. Trail maintenance could offset the negative effects associated with vegetation reducing trail access, and could increase the public use of the area.

Effects Common to Alternatives 2 and 3

Direct Effects

Recreation

Trail work associated with project implementation would be accomplished via non-mechanized (i.e. hand) methods. However, in the event of needed chainsaw use (i.e. specific instances where use of a handsaw is deemed unsafe), the noise and possible dust output would primarily affect recreation attributes of "remoteness of activity areas or travel ways," and "evidence of human activities" within the project area. Possible effects would be temporary, though potentially of moderate level. Timing of implementation could correspond to times of highest recreational use (implementation would occur between mid-September to late January, due to the Limited Operating Period for northern spotted owl). Overall recreation use within the project area is low, and the possible adverse effects to recreation are considered to be of a level that would be short-term and minor.

Fire can be a danger to public health and safety for visitors to the project area. Access to the project area will be closed to the public during prescribed fire and implementation

periods to avoid potential risks to public safety. Trails would be closed to all users as needed during implementation. Recreationists using off-trail portions of the project area (e.g. hunters) could be negatively affected by area closures. Monitoring of trails during burning operations, as well as posting closure information at trailheads would help to reduce the possible adverse effects to recreation.

Scenery

Since no new fire lines or helispots would be created during project implementation and existing fire lines would be cleared of large accumulations of downed debris, visual quality with respect to these implementation aspects would remain the same or improve under this alternative. The blasting of danger trees where feasible and the covering of any existing stumps along trails with duff would also minimize any negative impacts to visual quality in the project area.

The prescribed burn would cause the charring or blackening of trees to varying extents throughout the project area to create a mosaic burn severity pattern, primarily of low-to moderate-severity surface fires. Vegetation severity modeling predicts that approximately 10 percent of either action alternative will result in high severity, while approximately 15 percent will result in moderate vegetation severity (see project Fire, Fuels, Air Quality and Vegetation Report). Although research is somewhat limited regarding social perceptions of the aesthetic impacts of prescribed burning, some studies[3132] have noted the immediate and possible longer-term effects of charring or tree death as a result of prescribed burns being perceived negatively by the public. Other research, however, has found a positive perception of 'light' fires in that they improved scenic quality in a forested landscape within one to five years after implementation[33]. The visual impact of the prescribed low-to moderate-severity surface fire will be measurably less than the effects of large-scale, high-severity wildfires which have affected the project area in the past and are readily apparent. While there would be effects to scenic resources, they are considered to be less than significant and are consistent with the VQO of Preservation.

The consumption of some of the dense understory by prescribed fire would allow visitors to see further into the forest – allowing for more varied foreground and middle-ground views. More forest openings would also enhance visual diversity in form, color, texture, and scale which is seen as more interesting or visually desirable than a homogeneous landscape.

Potential visual impacts to scenery from smoke produced during project implementation would be reduced through design features that comply with regional and federal air quality standards. Periods of smoke would occur as a result of project implementation however they would be of short duration (see the Air Quality discussion above).

Prescribed burning would be conducted when hunting use is at its greatest, although overall use is typically low. The time frame of potential burn is dictated by the Limited Operating Period for northern spotted owl; however, air quality, weather, and fuel moisture conditions are the primary considerations for the specific time of burn within

[31] Gobster 1999.
[32] Ryan 2005.
[33] Taylor and Daniel 1984.

the allowable time frame. In this case, the severity of effects would not be outside the historic range of variability for natural fire events, so scenery effects would be negligible.

Approximately 9.4 miles of the New River are congressionally designated as a "Wild" river corridor under the Wild and Scenic Rivers Act, which seeks to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Proposed project activities include a prescribed fire that would back down the hillside from the west, with the New River acting as a natural control line for the prescribed fire. The surface fire is anticipated to burn in a mosaic of intensities resulting in a variation of degrees of fuel consumption. This activity has the potential to negatively affect scenic values if fire intensities within the one-quarter mile river corridor are severe and little to no vegetation survives. Overall, the results of the prescribed fire will be visible to the west of the New River designated corridor but the effects will be representative of the area's historic range of variability for vegetation conditions, and is considered a less than significant effect.

Socio-economics

There may be a direct effect of minimally increased local revenue during project implementation.

Wilderness Values

Safety considerations may necessitate the occasional use of chainsaws for short durations, which would produce short-term noise disturbance. Helicopters used to ignite prescribed fire would produce noise disturbance. The noise disturbance would primarily affect 'Pristine' wilderness values of "solitary or isolated experience," and "no evidence of human activities" within the project area. The effects would be temporary, though potentially of moderate level. Scheduling of fire treatments could correspond with peak hunting season (late September to early November) based on the Limited Operating Period for northern spotted owl. Trail access to project areas would be closed for safety during project implementation, reducing wilderness visitor exposure to project noise from motorized equipment to a level that is considered to be a less than significant effect.

Use of mechanized equipment, including helicopters and chainsaws, is generally prohibited by the Wilderness Act of 1964. A Minimum Requirement analysis has been completed (Appendix D of the EA) and approved by the Forest Supervisor for this project (see project record), which documents a project-specific exemption to this prohibition and ensures compliance with the Wilderness Act. Visibility and the sounds of mechanized equipment in the project area will be inconsistent with visitor expectations and wilderness values within the project area. This inconsistency will be of short and limited duration and is considered a less than significant impact.

Indirect Effects

Recreation

Implementing fuel reduction through prescribed fire would maintain or encourage late-successional characteristics (e.g. more spaces with large trees interspersed) over much of the project area over the long term. This would enhance the recreation experience, particularly with respect to "nature encounters" (e.g. increased opportunities to observe

wildlife) and enjoyment of late-successional forest characteristics such as large trees. Additionally, prescribed fire should increase the quality of browse in the project area for species such as deer (see the Wildlife report in the project record), which would increase the quality of hunting experiences as well. Indirect effects of smoke and noise from prescribed fire and project implementation would negatively affect recreation experience in the lands nearby the project area; however this effect would be of short duration and is considered a non-significant effect.

Scenery

Implementing fuel reduction through prescribed fire would maintain or encourage late-successional characteristics (e.g., more spaces with large trees interspersed) over much of the project area. This specific result would enhance scenery over the long-term, as openly-spaced larger trees are generally seen as more visually pleasing than expanses of smaller, more densely-spaced trees. This would be a minor beneficial effect. The project would indirectly change the vegetation structure in the area in a way that more closely represents the historic range of variability and that will be more resilient to wildfire in the future. This change will help to preserve long-term scenic values.

Socio-economics

As noted previously, fire concerns regarding public health and safety may necessitate the temporary closure of trails and other access points for recreationists. This, coupled with short-term increased smoke in the area may possibly decrease use of the surrounding area (i.e. areas outside of but nearby the project area that were not closed for safety concerns) during implementation of prescribed burns. Lower use of the area may then result in a negligible net financial loss to local businesses due to the current lack of use as well as the lack of services in nearby towns. Scheduling of fire treatments to occur outside of the peak recreation period would also likely reduce the adverse impacts to temporary and minor.

Wilderness Values

As noted previously, fire concerns regarding public health and safety may necessitate the temporary closure of trails and other access points for recreationists. This, coupled with short-term increased smoke in the area may possibly decrease the already minimal recreational use (i.e. hunting and fishing) during implementation of prescribed burns. This effect would be of short duration.

Lower use of the area may result in a negligibly increased ‘solitary’ experience for the wilderness visitors that do use the area once access is re-opened after project implementation. This effect would also be of short duration. There are no indirect project effects that would be inconsistent with the Wilderness Act.

Cumulative Effects

Recreation

Project effects include temporary closures to trails and short-term limitations to recreation access within areas immediately affected by implementation activity. Other trail maintenance projects could result in an increase in public use of the area, which

would increase the number of individuals that would be negatively affected by short-term project-related recreation closures. There are unlikely to be any additive or cumulative impacts associated with these limitations, as other planned trail work will not likely occur simultaneously with project implementation. No other projects are anticipated to contribute smoke to the area, might contribute to a cumulative effect of decreased quality of recreation experience in the area.

Scenery

Future trail maintenance projects within the area will improve public access and views of the project area landscape. This effect combines with the indirect effects of this project which will improve the quality of the scenery in the project area following a period of vegetation regrowth after initial implementation activities are complete. No negative cumulative effects to scenery are anticipated. The project area would continue to meet the Primitive ROS class and would be consistent with the VQO of Preservation.

Socio-economics

Implementation of either Alternative 2 or 3 could temporarily increase local employment during project implementation. No other management activities would contribute to this indirect effect.

Wilderness Values

Direct and indirect effects associated with the project are consistent with the wilderness values and with the Wilderness Act. Considering the cumulative impact of other project effects, namely trail maintenance using non-mechanized means, there would be no negative cumulative effect to wilderness values, or concern regarding compliance with the Wilderness Act.

Conclusion

Alternative 2 would have primarily beneficial effects to recreation, scenery, socio-economic and wilderness values through reducing the risk of large-scale, severe wildfires. Minor beneficial effects would occur due to creation of a more open setting with large trees and increased opportunities for wildlife viewing. Implementation of prescribed fire as proposed would create short-term minor adverse effects, however; these changes would be indistinguishable from the effects of a naturally occurring mixed-severity wildfire. Implementation of resource protection measures would reduce these effects to minor levels. The project area would continue to meet the Primitive ROS class and would be consistent with the VQO of Preservation.

Alternative 3 – Additional Treatment Areas

All effects described for Alternative 2 would apply to Alternative 3 as this alternative only adds acres of treatment. The addition of three treatment areas in Alternative 3 would increase the extent of both the short-term adverse effects and the long-term beneficial effects. In particular, the wilderness boundary to Virgin Creek (Soldier Creek) treatment area follows the ridgeline and the Soldier Creek Trail (7E01). Prescribed fire along the ridgelines will be more visible than other areas being treated. The character of the

backfire will result in irregular pattern of burn severity which will help decrease the visual contrast between these areas and the adjacent untreated landscape. Burning adjacent to the system trail will negatively affect the foreground views and recreation experience from this trail following project implementation. These negative effects will likely begin to be mitigated within one or five years as understory vegetation becomes established. The likelihood of short-term and minor adverse effects such as temporary trail closure, noise from helicopters, or possible chainsaw use (in the event of safety concerns) would be increased in this area.

Cultural Resources

The Area of Potential Effect[34] (APE) is the geographic area or areas, whether federally administered or not, within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist. The area of potential effect is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. The APE for the project encompasses approximately 58,350 acres of the Upper New River, Eagle Creek, and Sixmile Creek 6th field watersheds.

Existing Condition

Historic Condition

Historically, vegetation density and fuel loading within the Trinity Alps Wilderness was much less than it is now (see the Fire and Fuels discussion above). This historic condition was perpetuated not only by naturally occurring fire starts, but also to some degree by Native American fire use. Karuk and Hoopa peoples in this area used fire possibly every year during the late fall months (Hoopa Tribe 2009 personal communication and Karuk Tribal Council 2010 personal communication). Burning benefited wildlife and enhanced vegetation growth for plants used for craft materials and food. These human-ignited fires were probably of low intensity and were left to spread without any control. Access into the higher country was unhindered by large brush fields or heavy understory vegetation. This Native American management in the Trinity Alps – judging from comparative artifact dating – probably dates back 1000 to 2000 years (Theodoratus 1981).

Current Condition

Over 70 percent of the Area of Potential Effect has slopes ranging from 30-45 degrees. Cultural resources are generally not found on slopes this steep. Level terrain conducive to habitation is limited mainly to the surrounding ridgelines and in particular saddles. In addition, many of the ridgelines are very narrow and rocky, and are exposed to the elements. Current vegetation conditions (e.g. large areas of heavy, continuous brush) limit visibility and hiking access.

Ninety-eight percent of the project area has been subjected to wildland fire activity with about ninety-three percent of the area exposed to high severity fire. Fires that have

[34] 36 CFR 800.16(d).

occurred in the project area include the Corral Fire (2013), Megram Fire (1999), LT-17 Backbone Fire (2009), Bake Oven/Bar/Pigeon Fire (2006), Jim Jam Fire (1951), Red Spot Fire (2009), Red Cap Fire (1938), Carey Fire (2008), Trinity Fire (2009), and the Virgin Fire (1914).

Previously Recorded Sites

Thirteen cultural resources were previously documented within the Area of Potential Effect. One historic cabin and one historic mine were documented on USGS maps, the Megram Cabin and Brooks Mine. Both locations were investigated but no evidence of these sites was found. One prehistoric rock art site, one historic mining town (Old Denny), one historic homestead, one historic mine, one historic cabin, one ethnographic village site, two prehistoric habitation sites, one prehistoric lithic scatter and two multicomponent sites consisting of a historic town site and prehistoric village site and a historic homestead/mine and prehistoric habitation site were located within the Area of Potential Effect.

Newly Recorded Sites

District personnel intensively surveyed a total of 1,565 acres for this project during the 2011 field season. Seven new cultural resources were identified within the Area of Potential Effect; they were assigned site numbers as follows (the locations have not been included to maintain the sites' anonymity):

Table 3.31. Newly Recorded Sites in the Area of Potential Effect

SITE NUMBER	TYPE
05145400265	Prehistoric/Historic
05145400266	Prehistoric
05145400267	Prehistoric
05145400268	Prehistoric
05145500269	Historic
05145400270	Prehistoric
05145400271	Prehistoric/Historic.

In addition, four isolated cultural objects were found during the surveys; Isolates 1 and 2 occur within the Area of Potential Effect, while Isolates 3 and 4 occur outside it on the Klamath National Forest side of the Trinity Alps Wilderness.

Table 3.32. Isolated Finds in the Area of Potential Effect

SITE NUMBER	SITE NAME	TYPE
Isolate 1	Obsidian projectile point fragment	Prehistoric
Isolate 2	Heat treated chert secondary thinning flake	Prehistoric
Isolate 3	Ax cut cambium ponderosa pine	Prehistoric/Historic
Isolate 4	Chert slick rock	Prehistoric

Traditional Cultural Properties/Sacred Sites

The Forest has consulted with affected Tribes to elicit concerns and resolve mitigation issues prior to project activities. The Tribes identified several culturally sensitive areas within the Area of Potential Effect. For analysis purposes, the Forest Service assumes

these areas are eligible for the National Register of Historic Places as traditional cultural properties.

Environmental Consequences

The cumulative effects analysis area for analyzing the effects of the alternatives on cultural resources is the also the Area of Potential Effect, or approximately 58,350 acres of the Upper New River, Eagle Creek, and Sixmile Creek watersheds. The time period for measuring cumulative effects is approximately one year after completion of project activities. One year is the predicted time period before ground vegetation regrows sufficiently to cover cultural resource sites so that they are less visible to the casual observer.

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

No direct effects to cultural resources would occur from implementation of the No Action alternative. Indirectly, this alternative would increase the risk of large high-severity wildfires in the project area, which – if they were to occur – may impact cultural resources either directly by damage or destruction or indirectly by exposure through removal of concealing vegetation.

Lithic artifacts and organic material in archaeological sites could be damaged by high fire temperatures. Large-scale, high-severity fires could also cause adverse visual effects to landscapes associated with traditional cultural properties.

Certain suppression activities may also adversely affect cultural sites. Ground disturbance from fire line construction or tree falling, which are common activities during fire suppression, may diminish the integrity of cultural resource sites. Given the current fuels conditions within the project area, with implementation of this alternative the risk of adverse indirect effects to cultural resources from future fire suppression activities is high.

Cumulatively, the No Action alternative is likely to result in higher future vegetation fire severities, as fuels continue to accumulate and vegetation density increases over time. Future wildfires and the suppression activities needed to contain and control them under these conditions are likely to adversely affect historic properties, as was the case from the Megram (1999) and Backbone (2009) fires.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Prescribed fire could adversely affect various types of cultural resources through thermal effects. Excess heat can crack chert and obsidian stone tools. Any organic material present (bone, abalone shell, or antler) could be highly altered or destroyed. Project Burn Plans would be developed in consultation with the Karuk and Hoopa Valley Tribes and the Forest Heritage Program Manager to ensure adequate protection for historic properties.

Pre-treatment of identified culturally sensitive areas within proposed treatment areas would disperse heavy downed fuel accumulations and hand/point ignition away from

those locations. Cultural resource site boundaries would be clearly delineated for avoidance. By flagging and avoiding identified sites, the proposed action would not adversely affect historic properties' integrity of location, design, setting, materials, workmanship, feeling or association that would qualify those properties for consideration for inclusion within the National Register of Historic Places.

If any danger trees are felled within cultural resource sites, they could alter the setting, material or integrity of those sites. This potential adverse effect would be mitigated by directionally felling danger trees away from properties prior to ignition. Blasting (as permitted in wilderness), rather than felling with a chainsaw would be used whenever possible to minimize the visual effects of danger tree removal.

The proposed treatments would work toward resolving adverse effects to cultural resources in the area from recent wildfires (i.e. heavy dead and downed fuels accumulations that damaged documented sites and continue to limit access to them). In addition, the proposed treatments would reduce evidence of past fire suppression activities near traditional cultural properties/sacred sites.

Cumulative Effects

The only activities within the Area of Potential Effect that could overlap in space and time with the proposed activities are ongoing trail maintenance and fire suppression in the event of a wildfire. These activities are seasonal and ongoing from year to year and are part of the general baseline of activities that could occur within historical sites or traditional cultural properties.

A Forest Service system trail travels through all but one of the recorded sites within the Area of Potential Effect. In consultation with the Forest, the Tribes observed that access to traditional cultural areas via some of these trails has been hampered by overgrown vegetation, and that maintaining existing trails would improve access.

The consumption of vegetation from prescribed burning could expose some documented sites, as well as uncover previously undocumented sites, and the improved access and continued use of those trails may increase the potential for site looting, casual artifact collection or physical harm to sites. Given the area's current level of use, its remoteness, the restrictions on wilderness travel and activities (e.g. no mechanical equipment allowed), and the widespread distribution of cultural sites, any affects from increased trail use would be minor.

Post-project monitoring by a Forest Service archaeologist and, if available, a Tribal monitor would occur within one year after completion of each phase of prescribed fire treatment. Any illegal (looting) activity would be documented and immediately reported to appropriate law enforcement personnel.

Cumulatively, no adverse effects to historic properties' integrity of location, design, setting, materials, workmanship, feeling or association, would qualify those properties for consideration for inclusion within the National Register of Historic Places, would occur under either action alternative.

Climate Change

Existing Condition Ongoing climate change research has concluded that, on a global scale, climate is changing; that the change will accelerate; and that human greenhouse gas emissions – primarily carbon dioxide (CO_2) emissions – are the main source of accelerated climate change (USDA Forest Service 2009a). Climate change models and the predicted effects on different regions around the world show wide variation, with some regions greatly affected while others less affected. Regional trends over the last century are linked to climate change (Butz and Safford 2011).

Climate Trends and Projections

Regional Trends

Regional trends linked to climate change are related to forest structure, hydrology and forest fires.

Data on forest fire frequency, size, and total area burned and severity all show strong increases in California over the last two to three decades. Northern California forests have had substantially increased wildfire activity, with most wildfires occurring in years with early springs, and is likely attributable to both climate and land-use effects. Regarding climate effects, large percentage changes in moisture deficits in northern California forests were strongly associated with advances in the timing of spring (Butz and Safford 2011).

California's climate is expected to become warmer during this century. During the next few decades, average temperatures are projected to rise between 1 and 2.3°F. Toward the end of this century, statewide average temperatures are expected to rise between 3 and 10.5°F. Most models predicted that summers will be drier than they are currently, regardless of levels of annual precipitation (Butz and Safford 2011). With the projected rise in statewide average temperatures, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent.

A hotter, drier climate could promote up to 90 percent more wildfires in northern California by the end of the century by drying out and increasing the flammability of forest vegetation (California Climate Change Center 2006).

Local Trends

A summary of current and probable future trends in climate and climate-driven processes for the Shasta-Trinity National Forest and surrounding lands was completed in 2011 (Butz and Safford 2011). The summary examined weather station data for temperature and precipitation from six weather stations on or adjacent to the forest. The Big Bar and Weaverville weather stations are closest to the project area.[35] The following information on local trends is derived from the summary.

[35] The Big Bar meteorological record was considered too discontinuous to interpret for temperature or to allow interpretation of annual precipitation trends.

The Weaverville weather station exhibits significant increases in average temperatures of about 1-2° F; this trend is being driven by highly significant increases in mean minimum (i.e. nighttime) temperatures of 2-3° F.

There is very high variability in the Weaverville station annual precipitation records, such that the actual annual mean can't be predicted with accuracy. The five-year coefficient of variation of annual precipitation is increasing over time at Weaverville. An increasing coefficient of variation in annual precipitation means that year-to-year variability in precipitation has increased over the course of the last century, while a steady coefficient of variation denotes that year-to-year variability remains relatively stable.

While no modeling specific to the Trinity Alps project area exists,[36] a downscaling of three climate models for the Rogue River Badin in southwest Oregon and the Klamath River Basin led to a similar projection for northwest California that precipitation may remain roughly similar to historical levels but may shift in seasonality to occur predominantly in mid-winter months. Rising temperatures will increase the percentage of precipitation falling as rain and decrease snowpack considerably, resulting in drier summers. Both wet and dry cycles are likely to last longer and to be more extreme, leading to periods of deeper drought as well as periods of more extensive flooding (Butz and Safford 2011).

Climate Change and Wildfire Severity

Published accounts illustrate the increased intensity of fires over the last 25 years (Miller et al. 2009, Spies et al. 2006). Miller et. Al. (2009) noted a significant relationship between climate and forest fire activity from the early 20th century through 2006 in the Sierra Nevada and southern Cascade Mountains, with an increasing correlation between precipitation and temperature during the fire season. During the temporal span of their study, particularly over the last 25 years, researchers noted a correlation between increased fire severity and increased annual precipitation (Miller et al. 2009). Precipitation accounted for all or most of the variance in the latest period models.

The increase in fire severity was attributed to increased fuel loadings, and was presumed to be due to a combination of fire suppression and augmented vegetation growth due to increases in precipitation. Peak snowmelt is occurring earlier, fire season is lengthening, summer drought is deepening, and forest fuels are possibly at all-time highs (Miller et al. 2009).

Climate Change and Adaptation

Under some predictive scenarios, changes in climate may occur that exceed the capacity of existing forest tree populations to adjust physiologically and developmentally. In addition, climate change may occur at rates that exceed the capacity of forest species to adapt to new conditions or to migrate to more favorable environments. The forest trees

[36] To date no published climate change or vegetation change modeling has been conducted for the Shasta-Trinity National Forest. Few future-climate modeling efforts have treated areas as restricted as the State of California. The principal limiting factor is the spatial scale of the General Circulation Models that are used to simulate future climate change scenarios (Butz and Safford 2011).

living today will probably compose much of the forests of the next century (Anderson 2011).

Carbon Cycling and Forest Management

Forest management activities proposed for this project that are related to climate change include application of prescribed fire and related use of equipment.

Emissions from Equipment Usage

Restaino and Peterson (2013) found that emissions of carbon from equipment usage during fuel treatments amount to a small percentage of the total aboveground carbon stock. There is far greater variability and magnitude in treatment-related carbon emissions from prescribed fire.

Emissions from Prescribed Fire

Agreement exists across observed and simulated treatments that prescribed fire constitutes a substantial proportion of treatment emissions (Finkral and Evans 2008, North et al. 2009, Stephens et al. 2009, Sorensen et al. 2011). Prescribed fire is effective at reducing fine surface fuels and horizontal fuel continuity (van Wagtendonk et al. 1996, Graham et al. 2004).

Prescribed fire may consume substantial surface biomass, with smoldering consumption of the organic layer contributing to smoke and affecting soil nutrient cycling (Neary et al. 1999). Prescribed fire can generate fuels by killing understory trees (Agee 2003), and multiple treatments may be necessary to maintain reduced fire hazard over time.

Fuel treatments may effectively reduce disturbance severity with known carbon costs, although the expected carbon benefits from fuel reduction are realized only when wildfire occurs (Ager et al. 2010, Hurteau and North 2010).

Carbon Loss from Wildfire

In addition to releasing stored carbon to the atmosphere, intense wildfire can remove carbon from surface soils, emit large quantities of other greenhouse gases, result in large amounts of decomposing woody material, and consume large areas of forest as a mechanism for removing atmospheric carbon. Depending on the forest type, the area burned by a stand-replacing fire does not recover its pre-fire carbon stock for decades (Janisch and Harmon 2002).

Restaino and Peterson (2013) synthesized findings from several studies and compared the relative effects of fuel treatments and wildfire on carbon dynamics. They concluded that all studies agree unequivocally that untreated stands release more emissions to the atmosphere during wildfire than treated stands, and that emissions increase as burn severity increases. Tree mortality from wildfire is also consistently reduced by the presence of fuel treatments.

However, they also concluded that fuel treatments have a finite life expectancy, and fire hazard increases over time as fuels accumulate in treated areas. Repetition and maintenance of fuel treatments are necessary in order to effectively maintain reduced fire hazard over time (Peterson et al. 2005, Johnson et al. 2007, and Johnson et al. 2011) and thus must be included in analyses of long-term carbon storage.

Environmental Consequences

Alternative 1 - No Action

Direct, Indirect and Cumulative Effects

Effects on Carbon Cycling

Implementation of the no action alternative would have no direct effects on carbon cycling, since no activities would occur that would contribute to atmospheric carbon. Indirectly, the continued accumulation of untreated fuels in the project area would increase the risk that future wildfires would be widespread and of high severity (see the project Fire and Fuels Report). Carbon loss from widespread, high-severity fire would contribute to other sources of greenhouse gases at the project area and State levels.

Effects of Climate Change

Forest preservation, such as is generally practiced in wilderness management, can avoid CO_2 emissions. Net carbon storage will cease when the forest meets its biophysical equilibrium – when carbon inputs equal carbon outputs. Absent natural disturbance, the carbon stock then essentially becomes a static pool (US Environmental Protection Agency 2005).

Ongoing trends in the project area (e.g., continued accumulation of untreated fuels, fire suppression activities) would continue, with any change in conditions occurring due to natural processes and human-influenced trends from a global context over time, regardless of a no action decision. A landscape with unnaturally high fuel concentrations and in which suppression of fire continues would be less resilient to the predicted increases in wildfire severity as climate change progresses.

Effects Common to Alternatives 2 and 3

Direct and Indirect Effects

Effects on Carbon Cycling

Implementation of the proposed fuel treatments would result in some short-term releases of carbon, both from prescribed fire and from use of helicopters (and possible occasional use of chainsaws in fire line maintenance). Short-term emissions of carbon from the proposed activities would occur over a 1-2 day period for approximately 6-10 years. Helicopter flight time is predicted to be approximately 4-5 hours per day under either action alternative.

The burning prescription would favor conditions that would promote mostly low- to moderate-severity surface fire, with limited amounts of high-severity fire (see the project fire and fuels report). Air quality design features would minimize harmful emissions during project implementation as well as reduce predicted emissions from future wildfires (see the project air quality report). Fuel reduction would be achieved on approximately 16,709 acres under Alternative 2 and 19,088 acres under Alternative 3.

Effects of Climate Change

Although future climate change at the local level is uncertain, implementation of either action alternative would reduce the risk of future high-severity fires (see the project fire and fuels report), thereby improving the resiliency of the project area to drier or seasonally drier conditions. If the local climate shifts toward wetter conditions, reduction of current fuel levels would not have a detrimental effect. Moving the project area toward historic fire regime conditions would likely enhance the ability of project area ecosystems to adapt to climate change, whether the shift is toward drier or wetter conditions.

Cumulative Effects

As noted above, future fire behavior in the project area (as discussed in the fire and fuels section) is predicted to be much lower than under the no action alternative. Short-term emissions of carbon from the proposed activities would likely be offset in the event of a future wildfire occurring in or adjacent to the project area.

At the global scale, either action alternative would have a negligible effect on climate change. Because greenhouse gases from project activities would mix readily into the global pool of greenhouse gases, it is not possible to determine the indirect effects of emissions from single or multiples sources (e.g., at the project level). In addition, because most Forest Service projects are quite small in the context of global atmospheric CO_2, it is not currently possible to conduct a confident, quantitative analysis of actual climate change effects based on individual or multiple projects (USDA Forest Service 2009a).

Available data indicate that 33 million acres of forest in California store an estimated 1,333.9 million bone-dry tons of carbon in live trees, snags and down wood (Christensen et al. 2007). The 58,349-acre project area represents a small portion (0.17 percent) of forest lands in California; proposed treatments constitute and even smaller portion (16,709 acres or 0.04 percent under Alternative 2 and 19,088 acres or 0.05 percent under Alternative 3). By contrast, one wildfire (the 1999 Megram fire) burned over 49,000 acres within the project area, with 40 percent of those acres experiencing moderate- or high-severity fire and large areas of overstory loss, which – as noted above – contributes more atmospheric carbon than the lower severities typical of prescribed fire.

The benefits of fuel reduction would likely begin to decline after about 15-20 years, at which time additional prescribed fire treatments may be needed – depending on occurrence of wildfire and other natural disturbance in the project area. These treatments would result in additional short-term releases of carbon, but would be expected to emulate emissions from mostly low- to moderate-severity surface fire, which occurred historically in the project area.

Alternative 3 – Additional Treatments

Direct Effects

Because Alternative 3 would treat fuels in the Virgin Creek drainage, the benefits of fuel reduction and enhanced landscape resilience to future wildfires would be realized over a larger area than under Alternative 2. The 2,379 additional acres of prescribed fire would contribute slightly more short-term carbon loss than Alternative 2.

Environmental Justice (Executive Order 12898 as Amended by 12948)

Per direction in Executive Order 12898, all federal actions are required to consider the potential of disproportionate effects on minority and low-income populations in the local region (Office of the President 1994). The principles of Environmental Justice require agencies to address the equity and fairness implications associated with federal land management actions.

The Native American population meets the Environmental Justice criterion as a minority population meaningfully greater than the general population of the states. Therefore, decision makers should pay careful attention to the potential impacts of management actions on Native Americans.

No disproportionate adverse effects on low income or minority populations are expected as a result of implementation of either action alternative. Temporary trail or area closures, disturbance from smoke or noise during project implementation and any decrease or increase in revenues in local communities as a result of the project would affect wilderness users and community residents equally, regardless of socio-economic or minority status. District staff met with members of the Yurok, Hoopa Valley and Karuk Tribes several times during development of the project and project analysis (see Table C.1 in Appendix C – Public Involvement). No concerns pertaining to Environmental Justice were raised.

CHAPTER 4 – CONSULTATION AND COORDINATION

Preparers and Contributors

Table 4.1. List of preparers – Trinity Alps Wilderness Prescribed Fire project Environmental Assessment.

Specialist	Organization	Title	Contribution
Mark Arnold	Shasta -Trinity NF	Archaeologist	Cultural resources
Beth Stewart	VMS Enterprise	Vegetation Specialist	Vegetation
Christine West	VMS Enterprise	Botanist	Special status plants and fungi Invasive species Recreation/Scenery/Wilderness Geospatial data
Cedra Hill	VMS Enterprise	GIS Specialist	Geospatial data
Trish Johnson	VMS Enterprise	Wildlife Biologist	Special status terrestrial wildlife species
Jules Riley	VMS Enterprise	Hydrologist	Hydrology Soils Geology
Anna E. “Betsy” Hammet	VMS Enterprise	Biological Scientist	ID Team leader Writer/Editor
Ben Newburn	VMS Enterprise	Fuels Specialist	Fire and fuels Air quality
Fran Smith	ACT2 Enterprise	Fisheries Biologist	Special status aquatic species
Stephanie Riess	Shasta -Trinity NF	Environmental Coordinator	ID Team leader Writer/Editor
Lara Graham	Shasta -Trinity NF	Fuels Specialist	Fire and fuels Air quality
Tom Quinn	Shasta -Trinity NF	Wildlife Biologist	Special status terrestrial wildlife species
Susan Erwin	Shasta -Trinity NF	Botanist	Special status plants and fungi Invasive species
Lusetta Sims	Shasta -Trinity NF	Botanist	Special status plants and fungi Invasive species
Juan delaFuente	Shasta -Trinity NF	Province Geologist	Geology
Brad Rust	Shasta -Trinity NF	Soil Scientist	Soils
Stephanie Joyce	Shasta -Trinity NF	Forest Landscape Architect	Scenery
Jan Sorochtey	Shasta -Trinity NF	Resource Officer, Recreation and Wilderness	Recreation/Wilderness
Mike McFadin	Shasta -Trinity NF	Recreation/Wilderness Manager	Recreation/Wilderness
Fred Levitan	Shasta -Trinity NF	Zone Hydrologist	Hydrology
Christine Mai	Shasta -Trinity NF	Forest Hydrologist	Hydrology
Christine Jordan	Shasta -Trinity NF	Fisheries Biologist	Special status aquatic species
William Brock	Shasta -Trinity NF	Fisheries Biologist	Special status aquatic species
Keli McElroy	Shasta -Trinity NF	Forest Silviculturalist	Vegetation

Specialist	Organization	Title	Contribution
Kathy Roche	Shasta -Trinity NF	Ecosystem Staff Officer	Writer/Editor
Chris Losi	Shasta -Trinity NF	Forest Environmental Coordinator	Editor
Christina Boston	Forest Service Region 5	Regional Wilderness and Wild and Scenic Rivers Program Leader	Wilderness/Scenery
Angela Abel	Shasta-Trinity NF	Recreation Staff Officer	Recreation/Wilderness
Sally Cousins	Shasta-Trinity NF	Recreation Staff Officer	Recreation/Wilderness
Zanard Choice	Shasta-Trinity NF	Forest Landscape Architect	Wilderness/Scenery

Agencies, Organizations and Private Individuals

The Forest Service consulted the following Federal, State, and local agencies; Tribes; and private individuals, industry representatives and organizations during the development of this environmental analysis:

Table 4.2. List of Federal, State and local agencies contacted during the scoping period.

Name	Organization
Bill Kuntz	Bureau of Land Management
Walter Herzog	Bureau of Land Management – Redding
Shasta-Trinity Unit	CalFire
John Knight	CalFire
David McNamara	CalFire
Duane Shintaku	CalFire
Bob Williams	California Department of Fish and Game
Stacy Stanish	California Department of Fish and Game
Fred Blatt	California Regional Water Quality Control Board
Dennis Heiman	California Regional Water Quality Control Board
Maggie Robinson	California Regional Water Quality Control Board
	Central Valley Regional Water Quality Control Board – Redding Branch
Chris Heppe	Environmental Protection Agency
	Hayfork Volunteer Fire Department
Shasta-Trinity NF Level 1 Representative	National Marine Fisheries Service
Maggie Robinson	North Coast Regional Water Quality Control Board
Ric Costales	Siskiyou County Natural Resources
Linda West	Six Rivers National Forest
	Trinity County Chamber of Commerce

Name	Organization
Jerry Fulton	Trinity County Fair
Jesse Cox	Trinity County Fire Safe Council
	Trinity County Historical Society
	Trinity County Library
John Jelicich	Trinity County Planning Department
Jan Smith	Trinity County Planning Department
Barbara Rapinac	Trinity County Solid Waste
	Trinity County Board Of Supervisors
Keith Paul	U.S. Fish and Wildlife Service, Red Bluff Field Office
Robert Carey	US Fish and Wildlife Service, Yreka Field Office
Lindsey Hellekson	US Fish and Wildlife Service, Yreka Field Office
Kelly Forth	Weaverville-Douglas City Park
	Weaverville Fire District
Barbara & Donald Darst	Willow Creek Fire Safe Council

Table 4.3. List of Tribal representatives contacted during the scoping period

Name	Title	Organization
		Hoopa Valley Tribe
Michelle Endicot	Tribal Secretary	Nor-El-Muk Nation
Raymond Patton		Nor-El-Muk Nation
Marilyn Delgado		Nor-El-Muk Wintu Nation
Paul Ammon		Tsnungwe Council

Table 4.4. List of organizations contacted during the scoping period

Name	Title	Organization
Richard Svilich	Northern California Representative	American Forest Resource Council
Kate Tiedeman		California Wilderness Coalition
Chris Colson		Californians for Alternatives to Toxics
		Center for Biological Diversity
Joseph & Susan Bower		Citizens for Better Forestry
Denise Boggs	Executive Director	Conservation Congress
Geoff Teare		CORVA
Scott Greacen	Executive Director	EPIC – Environmental Protection Information Center
Kimberly Baker	Public Lands Advocate	EPIC – Environmental Protection Information Center
		Graduates for Old Growth
Kelly Hellstrom		Klamath Project Coordinator
George Sexton	Conservation Director	Klamath Siskiyou Wildlands Center
John Hair		MVUSD
Jim French		Natural Resources Advisory Council
		The Nature Conservancy
		Pacific Rivers Council
Danny Hagans		Pacific Watershed Association
Kent Collard		RAC

Name	Title	Organization
Bill Huber		South Fork Trinity River Coordinated Resource Management and Planning
		Sierra Club
		Sustainable Northwest
Joe Polselli & Arnold Whitridge		TrailWeavers Network
Colleen O'Sullivan		Trinity Resource Conservation & Development Council
Pat Frost & Noreen Doyas		Trinity Resource Conservation & Development Council
Jerry Hauke		Trinity Resource Conservation & Development Council
Scott Eberly		Trinity Resource Conservation & Development Council
Tom Hale		Trinity Riders
Lynn Jungwirth		Trinity River Restoration Program
		Watershed Center
Scott Morris		Weaverville Basin Trail Committee
		Weaverville Basin Trail Committee

In addition, we contacted 169 private individuals and private industry representatives during the scoping period.[37]

[37] See the project mailing list in the project record.

APPENDIX A – ABBREVIATIONS, ACRONYMS, AND GLOSSARY

Abbreviations and Acronyms

ACS	Aquatic Conservation Strategy
ARR	Archaeological Reconnaissance Reoport
BAER	Burned Area Emergency Response
BehavePlus	Surface fire behavior spread model used to predict fire behavior in stands before and after proposed treatments
BMP	Best Management Practice
BMPEP	Best Management Practice Evaluation Program
CDFG	California Department of Fish and Game (now California Department of Fish and Wildlife)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWD	Coarse Woody Debris
CWE	Cumulative Watershed Effects
CWPP	Community Wildfire Protection Plan
DN	Decision Notice
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERA	Equivalent Road Acres; a component of the Cumulative Watershed Effects model
ERA/TOC	Equivalent Road Acres divided by Threshold of Concern in the Cumulative Watershed Effects model
ESA	Endangered Species Act
FlamMap	A fire behvaior mapping and analysis program used to compute potential fire behavior characteristics over a landscape
FOFEM	First Order Fire Effects Model (a model used to predict fire effects in stands before and after the proposed treatments)
FONSI	Finding of No Significant Impact
FOREST PLAN	Land and Resource Management Plan (also LRMP)
FS	Forest Service

GEO	Landslide potential (mass wasting), a component of the Cumulative Watershed Effects model
IDT	Interdisciplinary Team
LRMP	Land and Resource Management Plan (also Forest Plan)
MA	Management Area
MIA	Management Indicator Assemblages
MOU	Memorandum of Understanding
MRDG	Minimum Requirements Decision Guide
NCRWQCB	North Coast Regional Water Quality Control Board
NEPA	National Environmental Policy Act of 1969
NFP	National Fire Plan
NOAA	National Oceanic and Atmospheric Administration
NFMA	National Forest Management Act of 1976
NMFS	National Marine Fisheries Service
NF	National Forest
NFS	National Forest System
NSO	Northern Spotted Owl
NWCG	National Wildfire Coordinating Group
OSHA	Occupational Safety and Health Administration
PM 10	Particulate Matter < 10 Microns in Size
RR	Riparian Reserve
SMZ	Streamside Management Zone
SONCC	Southern Oregon / Northern California Coasts
TEPS	Threatened, Endangered, Proposed and Sensitive
USDA	United States Department of Agriculture
USLE	Universal Soil Loss Equation, a Component of the Cumulative Watershed Effects Model
USFWS	US Fish and Wildlife Service
VQO	Visual Quality Objective
WSR	Wild and Scenic River
WUI	Wildland-Urban Interface

Glossary

90th Percentile Weather Conditions – the highest 10 percent of fire weather days, where fuel moisture, temperature, relative humidity and wind speed values represent the upper 10 percent of the data based on historical observations.

Activity Center (NSO) – an area of concentrated activity of either a pair of northern spotted owls (NSO) or a territorial single NSO.

Aerial ignition – method of igniting a prescribed fire that entails the use of aerial equipment such as helicopters equipped with an ignition device. Aerial ignition, if conducted properly, enhances safety, mitigates hazards associated with ground ignition, and reduces the number of personnel exposed to risk.

Anadromous fish bearing streams – streams that support fish species that return from the ocean to reproduce.

Backing fire – a segment of fire perimeter oriented opposite the direction of maximum spread. The rate of spread and fire line intensity are usually low.

Burn plan (prescribed burn unit plan) – a field document, required for all prescribed burning activities, that sets forth the details for conducting a site-specific burn treatment. The prescribed burn plan details the prescription parameters and professional standards to be utilized in conducting the burn.

Burn probabilities – Burn probability modeling simulates the effect of the ignition and spread of a very large number of fires on a raster landscape to calculate spatially explicit outputs (i.e. likelihood of ignition) on a landscape level; model used to understand fire probability on a given landscape. High burn probabilities are related to large fire occurrence on the landscape. Outputs – expressed as a percentage - are described as follows:

Low - 0 to 25 percent
Moderate – 26 to 50 percent
High – 51 to 75 percent
Very High – 76 to 100 percent

California Air Resources Board (CARB) – a department in the California Environmental Protection Agency established in 1967 in the Mulford-Carrell Act, combining the Bureau of Air Sanitation and the Motor Vehicle Pollution Control. The stated goals include attaining and maintaining healthy air quality, protecting the public from exposure to toxic air contaminants; and providing innovative approaches for complying with air pollution rules and regulations

Communities at risk – identified communities within the WUI at high risk to wildfire, listed, published and maintained in the state of California by the California Fire Alliance. Initially published in the Federal Register (USDA Forest Service and US Department of Interior 2001).

Critical Habitat – defined in the Endangered Species Act as

1. the specific areas within the geographical area occupied by the species, at the time it is federally listed, on which are found those physical or biological features

essential to the conservation of the species, and which may require special management considerations or protection; and

2. specific areas outside the geographical area occupied by the species at the time it is listed, when it is determined by the Secretary of the Interior that such areas are essential for the conservation of the species.

Crown fire – a fire burning in the crowns of forest vegetation; can be passive, active, independent or intermittent, as defined below (Scott and Reinhardt 2001):

> Passive crown fire is a crown fire in which individual or small groups of trees torch out, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior from the occasional torching of an isolated tree to a nearly active crown fire. Also called torching and candling.
>
> Active crown fire is a crown fire in which the entire fuel complex becomes involved, but the crowning phase remains dependent on heat released from the surface fuels for continued spread. Also called running and continuous crown fire.
>
> Independent crown fire spreads without the aid of a supporting surface fire.
>
> Intermittent crown fire alternates in space and time between active crowning and surface fire or passive crowning.

Cumulative watershed effects – environmental changes that are affected by more than one land-use activity and that are influenced by processes involving the generation or transport of water.

Cumulative Watershed Effects (CWE) Analysis – For this project, the CWE analysis includes three models:

1. a surface erosion sediment production model (USLE),
2. a landslide sediment production model (GEO), and
3. a disturbance model to predict increased peak stream discharge, based on equivalent roaded acres (ERA). The CWE models of sedimentation (surface erosion and landslides [USLE and GEO]) and hydrologic runoff (ERA) accumulate disturbances relative to land sensitivity at the 8^{th}, 7^{th}, 6^{th} and 5^{th} field watershed scales, based on a set of assumptions and coefficients. The estimated results fall on a continuum. As disturbances increase over time and space, at some point the risk of initiating or contributing to existing adverse cumulative watershed impacts becomes a cause for concern.

Danger tree (hazard tree) – a standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree (US Department of Labor OSHA 1994).

Direct fire suppression (direct attack) – any treatment applied directly to burning fuel such as wetting, smothering, or chemically quenching the fire or by physically separating the burning from unburned fuel. This includes the work of urban and wildland fire engines, fire personnel and aircraft applying water or fire retardant directly to the burning fuel.

Ecosystem or Watershed Analysis – a systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives.

Elevated CWE Risk Ratios – a risk ratio above 0.80. Elevated risk ratios are in the zone of concern. The Threshold of Concern (TOC) for a watershed is reached when a risk ratio is 1.0.

Detrimentally Disturbed Soils – Detrimentally disturbed soils are those that have been detrimentally displaced, compacted, puddled, or severely burned. Detrimental soil disturbance occurs when soil hydrological function and site productivity are adversely affected so that established threshold values for soil properties are exceeded and result in significant change.

Essential Fish Habitat – In 1996, Congress passed the Sustainable Fisheries Act (Public Law 104-297), which amended the habitat provisions of the Magnuson Act. The re-named Magnuson-Stevens Act calls for direct action to stop or reverse the continued loss of fish habitats.

Fire line intensity (also known as fire intensity) – the rate of energy release (in BTUs) per unit length of flaming front. The amount of heat one would be exposed to per second while standing immediately in front of the fire. Often referred to as "fire line intensity" in modeling outputs.

Fire severity – the magnitude of fire effect on organisms, species and the environment. Commonly applied to a number of ecosystem components including – but not restricted to – soils, vegetation, trees, animals and watersheds.

Vegetation-based fire severity (Miller et al. 2009):

- unchanged = no fire effects
- Low = l0-25 % mortality
- Moderate = 26 to 75% mortality
- High = greater than 75%

Fire regime – the long-term fire pattern characteristics of an ecosystem described as a combination of seasonality, frequency, spatial complexity, intensity, duration and scale.

Fire return interval – the length of time between fires on a particular landscape.

Flame length – the average distance (in feet) from the base of the flame to its highest point. Flame length is the only measurement that can be taken easily in the field that is related to fire line intensity. Flame lengths are described in Appendix B of the Fire Line Handbook (NWCG 2006) and are defined as follows:

Very Low – Non-flammable areas such as rock outcropping, water, etc.

Low – Flame lengths 0 to 4 feet. Persons using hand tools can generally attack fires at the head or flanks of the fire.

Moderate – Flame lengths 4 to 8 feet. Fires are too intense for direct attack on the head of the fire by persons using hand tools. Equipment such as dozers, engines and retardant aircraft can be effective.

High – Flame lengths 8 to 12 feet. Fires may present serious control problems such as torching, crowning, and spotting. Control efforts at the head of the fire will probably be ineffective.

Very High – Flame lengths greater than 12 feet. Fires present serious control problems and control efforts are typically ineffective.

Hand lighting methods – means of igniting a prescribed fire that involve ground personnel using fire ignition tools (generally a drip torch filled with approved burn mix), which requires personnel to walk through the prescribed burn area to light the fire.

Ignition pattern – a predetermined method of lighting a prescribed fire that considers topography, location, geography, slope position and vegetation to achieve the desired results of the prescribed fire effects and enhance the ability to control the burn.

Indirect fire suppression (indirect attack) – preparatory suppression tactics used a distance away from the oncoming fire are considered indirect. Fire lines may be built in this manner as well. Fuel reduction, indirect fire lines, contingency fire lines, back burning and wetting unburned fuels are examples.

Inference Points (CWE Model) – points used to inform management decisions about the risk of cumulative watershed effects. Inference points do not represent the exact point at which CWEs will occur, but serve as an indicator of increasing susceptibility for significant adverse effects occurring within a watershed. When an inference point is reached, a closer look at the affected watershed is warranted. Refer to risk ratio.

Invasive species – species that have the potential to threaten ecosystem integrity and degrade wildlife habitat by displacing and competitively excluding native species from local plant communities.

Late-Successional Reserves – reserves designed to maintain and enhance late successional forests as a network of existing old-growth forest ecosystems, although their size, distribution and management vary. These reserves represent a network of existing old growth forests that are retained in their natural condition with natural processes, such as fire, allowed to function to the extent possible.

Risk Ratios (CWE Model) – Risk ratios are calculated by dividing accelerated sedimentation and ERA values by the inference point value. A risk ratio of 1.0 is said to be "at the inference point."

Sclerophyllous – woody and/or leathery; used to describe the leaf characteristics of certain shrub species, most often as related to flammability.

Seral Condition – the age and development of forest communities and the physical canopy characteristics.

Sensitive species - species eligible for listing under the Endangered Species Act, or whose viability is of concern.

Suitable Habitat – habitat containing the biological and physical components necessary to meet some or all the life needs of a species.

Limited operating periods (LOPs) – periods when treatments are restrained due to issues of concern, generally wildlife nesting season for species of concern.

Longline (helicopter) – use of a fixed rope attached to a helicopter to transport cargo and supplies.

Lop and scatter – a method of disposal that involves cutting (lop) and dispersal (scatter) of fuels to designated specifications.

Management Indicator Assemblages (MIA) – groups of wildlife associated with vegetation communities or key habitat components, as identified in the Forest Plan (page 3-24). The Forest Plan directs resource managers to monitor assemblage habitat trends at the National Forest scale (Forest level). The Forest Plan permits the use of habitat components to represent the management indicator assemblages. Project level effects on management indicator assemblages are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act.

Minimum Impact Suppression Tactics (MIST) – wildland firefighting techniques that involve use of the minimum amount of force necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. Methods used to suppress a wildfire while minimizing the long-term effects of the suppression action on the land. MIST may include rehabilitation of evidence of suppression efforts, including constructed fire lines.

Noxious Weeds – see "Invasive Species"

Prescribed fire – a fire treatment to meet one or more specific management objectives. Prescribed fires follow site-specific documents directing their preparation, administration and implementation.

Pruning – removal of branch material from the bole of a living tree. The effect of pruning is to raise crown base height so that there are discontinuous fuels from the forest floor to the crown of the living trees.

Watch List species - species that do not meet the criteria to be included on the Regional Forester's Sensitive Plant List or the LRMP, but are of sufficient local viability concern to be considered in the planning process.

Watershed – the entire land area that drains to a specific point. Watersheds are usually delineated by Hydrologic Unit Codes (HUC). For example:

- A 5th field watershed (5th field HUC) ranges from about 40,000 to 250, 000 acres in size.
- A 6th field watershed (6th field HUC) ranges from about 10,000 to 40,000 acres in size.
- A 7th field watershed (7th field HUC) ranges from about 2,500 to 10,000 acres in size.

See http://pubs.usgs.gov/wsp/wsp2294/ for more information.

Wildland urban interface (WUI) – the area where human development and structures (urban) intermingle with undeveloped areas (wildland).

APPENDIX B –BEST MANAGEMENT PRACTICES AND AQUATIC CONSERVATION STRATEGY OBJECTIVES

Best Management Practices (BMPs)

Best Management Practices (BMPs) were developed to comply with Section 208 of the Clean Water Act. BMPs have been certified by the State Water Quality Resources Control Board and approved by the Environmental Protection Agency (EPA) as the most effective way of protecting water quality from impacts stemming from non-point sources of pollution. These practices have been applied to forest activities and have been found to be effective in protecting water quality in the Shasta-Trinity National Forest. Specifically, effective application of the U.S. Forest Service Region 5 BMPs has been found to maintain water quality that is in conformance with the Water Quality Objectives in the North Coast Regional Water Quality Control Board's (NCRWQCB) Basin Plan.

Forest Service Region 5 BMPs have been monitored and modified since their original implementation in 1979 to make them more effective. Numerous on-site evaluations by the NCRWQCB have found the practices to be effective in maintaining water quality and protecting beneficial uses. The 2009 USDA Forest Service Pacific Southwest Region Best Management Practices Evaluation Program (BMPEP) (USDA Forest Service 2009b) included 2,861 randomly-selected onsite evaluations of Best Management Practice (BMP) implementation and effectiveness between 2003 and 2007. For the 5-year reporting period, 86 percent of Best Management Practices (BMPs) were rated as implemented and 89 percent were rated as effective. Among implemented BMPs, 93 percent were rated effective. Several BMPs have been 95 to 100 percent effective when implemented, including almost all BMPs for timber harvests, vegetation management, and prescribed fire.

The Shasta-Trinity National Forest monitors the implementation and effectiveness of BMPs on randomly selected projects each year. Implementation of BMPs occurred on an average of 85 percent of sites in 2006 through 2010. BMP effectiveness requirements were met on an average of 95 percent of the sites sampled in 2006-2010.

The following BMPs for the control of nonpoint source pollution associated with fuel management activities would be implemented as part of either action alternative. A description of the objective of each BMP is included, as well as how each practice would be specifically implemented. For additional information on the BMPs and their objectives, see Water Quality Management for Forest System Lands in California (USDA Forest Service 2000b).

BMP 1.3 – Use of Erosion Hazard Rating for Unit Design

The objective is to identify high or very high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality impacts. Post-burn soil cover would be evaluated by the soil scientist so that fuel management options can be adjusted to minimize soil erosion.

BMP 2.12 – Servicing and Refueling of Equipment

All fueling will be conducted in a designated area, typically on trails or existing fire lines. Equipment will have ongoing inspections for fuel leaks. Absorbent material will be used on all drips. All contaminates (including soil) will be taken off site in the event of leaks or spills.

This BMP would be applied to helicopter staging areas and to chainsaw refueling areas for the project.

BMP 2.21 – Water Source Development Consistent with Water Quality Protection

There would be no water source development (i.e. water drafting) within the project area. Prescribed fire would be controlled by natural topographic features, existing trails and fire lines, and fire hand crews.

BMP 6.1 – Fire and Fuel Management Activities

This BMP is designed to reduce public and private losses and environmental impacts which result from wildfires and/or subsequent flooding and erosion by reducing or managing the frequency, intensity and extent of wildfire. The management requirements, mitigation measures, and multiple resource protection prescriptions are documented in the project planning and decision documents.

BMP 6.2 – Consideration of Water Quality in Formulating Fire Prescriptions

This BMP is designed to provide for water quality protection while achieving the management objectives through the use of prescribed fire. The required prescription elements and the optimum and maximum acceptable disturbance will be assessed by and IDT and the fire prescription will be prepared by the fire management officer or fuel management specialist. The fire prescription will be reviewed by the IDT and will be approved by the appropriate line officer.

BMP 6.3 – Protection of Water Quality from Prescribed Burning Effects

This BMP is designed to maintain soil productivity, minimize erosion, and minimize ash, sediment, nutrients, and debris from entering water bodies. The IDT will identify streamside management zones (SMZs) and soils with high risk of becoming water repellant as part of project planning.

BMP 7.8 – Cumulative Off-Site Watershed Effects

Cumulative Watershed Effects models (CWE models) that have been established for use in Region 5 of the Forest Service, and calibrated for use on the Shasta-Trinity National Forest, were utilized to analyze existing watershed conditions and the effects of the project. The results of CWE modeling[38] show that the impacts of the project do not result in watershed conditions that approach a Threshold of Concern (TOC) for adverse watershed impacts.

[38] CWE modeling results are discussed in detail in the project Soil, Hydrology and Geology Report in the project record.

Aquatic Conservation Strategy Objectives of the Northwest Forest Plan[39]

Through implementation of the above BMPs and other design features described in Chapter 2, both action alternatives would meet the objectives at the project scale and not prevent attainment of the objectives at the watershed scale that are set forth in the Aquatic Conservation Strategy as incorporated into the Forest Plan. The Aquatic Conservation Strategy is to "maintain and restore the ecological health of watersheds and aquatic ecosystems contained within them on public lands" and to "prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds (USDA Forest Service and USDI Bureau of Land Management 1994)."

Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. Treatments are designed to restore stand structure and species diversity. Proposed treatments would accelerate the development of vegetation conditions that would have existed historically under a more natural fire regime. Treatments within riparian reserves would result in an improved trend for large wood recruitment, stream shading and other key riparian system processes. Proposed treatments would also reduce the risk of a high-severity wildfire occurring within riparian reserves.

Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. Proposed treatments would not directly impact the connectivity between watersheds, subwatersheds or drainages. Proposed activities do not result in any physical or chemical barriers to migration routes or change access to spawning and rearing areas for aquatic species. In the long term, the action alternatives would improve spatial and temporal connectivity by promoting vegetation conditions that more closely represent those found under natural fire regimes for the area. As a result, the delivery of watershed products linked to fire processes would also be moved closer to conditions that existed prior to fire suppression.

[39] A detailed discussion of the action alternatives with regard to Aquatic Conservation Strategy objectives is in the project fisheries biological assessment (BA) in the project record.

Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. Project activities for either action alternative would be localized over time and space and would not cause measurable changes in channel features. Treatments within riparian reserves would maintain channel integrity and processes through the use of design features and BMPs. Peak flows are not expected to increase; therefore, increased channel cutting is not anticipated.

Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. Water quality of streams within the project area would be maintained under either action alternative. Stream shading would not be affected, so no increase in stream temperatures would occur. Likewise, baseflow and peak flows are not expected to be measurably affected. Only minimal, short-term increases in sediment and nutrient delivery to stream are expected.

Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. No long-term increases in either erosion at the site of project activities or sediment delivery to stream channels and other aquatic species habitats are expected for either action alternative. There is slight short-term risk (one to three years post-treatment) of increased surface erosion associated with prescribed burning actions. As a result, there may be insignificant, short-term, localized increases in instream turbidity, fine sediment, and nutrients at the site scale. This is the same process, though at a smaller scale, that occurs after wildfires. Although prescribed burning removes soil cover and has the potential for short-term increases in surface erosion and nutrient mobilization, impacts to aquatic habitats would not be measureable at the drainage (HUC 8), subwatershed (HUC 7) or watershed (HUC 5) scale with implementation of project design features and BMPs. In the long term, if the fire regime is modified to more closely mimic a historic regime, such that the amount of landscape burned at high intensity is reduced, then sediment production from fire disturbances would also trend toward historic levels.

Objective 6. Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high and low flows must be protected.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. It is unlikely that proposed activities under either action alternative would cause detectable changes in instream flows. The low intensity

and patchy nature of the prescribed burns would reduce the potential for hydrophobic soil formation (which reduces water infiltration). Bare areas created by prescribed fire are surrounded by unburned areas that act as buffers to slow surface flow and trap sediment. Since project activities would not increase compaction or result in large barren or hydrophobic areas, water run-off at the site scale would not measurably increase. Roads and road drainage structures (ditches, relief culverts, etc.) are the highest contributors to increasing drainage networks and delivering concentrated water flows to stream channels. As the project area is within the wilderness boundary (an unroaded area), it would not change road densities or road drainage patterns.

Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Neither action alternative would prevent the attainment of this objective at the project or watershed scale. Floodplains, meadows, and wetlands are all included within riparian reserve designations. No ground disturbing activities would occur within these areas and the proposed activities would not affect the timing, variability, or duration of floodplain inundation. Treated areas may have increased soil moisture but not enough to measurably affect water table elevations.

Objective 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. Low-severity backing fire in riparian reserves would remove accumulated ground and dead fuels and denser low-growing understory vegetation in order to eliminate ladder fuels, thereby reducing the threat of a crown fire. Large overstory vegetation would remain intact and would continue to provide thermal regulation. In the long term, treatments in riparian reserves are expected to promote the growth of larger conifer and hardwood species already present, resulting in a more diverse forest structure and a source of coarse woody debris. Project activities would move riparian reserves toward greater resilience to wildfire while maintaining riparian processes and function.

Objective 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Either action alternative would meet this objective at the project scale and not prevent its attainment at the watershed scale. The action alternatives are designed to reduce fuel loading and move the fire regime closer to that which occurred historically on the landscape and within riparian reserves. As discussed above, allowing fire to back into riparian reserves would increase the diversity and overall health of riparian communities. No adverse impacts to aquatic species are expected to occur in or downstream of the project area as a result of the project in the short term. Beneficial effects to riparian and aquatic habitat are expected in the long term.

APPENDIX C – PUBLIC INVOLVEMENT

Public Participation Plan

A public participation plan was prepared in order to solicit timely and useful input from members of the public and other agencies on the Trinity Alps Wilderness Prescribed Fire Project. Table C.1 below details the process by which the public was informed of the proposed action, encouraged to collaborate on the project and asked for comments.

Table C.1. Public Participation Plan – Trinity Alps Wilderness Prescribed Fire Project.

Public Participation Activity	Responsibility	Planned	Accomplished
Post proposal to PALS (Planning Appeals and Litigation System) database and Forest website.	District Liaison	March 2010	March 2010
List Proposal in Schedule of Proposed Actions	District Liaison	March 2010	3/01/2010
Contact the Salmon River Fire Safe Council - Jim Villeponteaux at Office: (530) 462-4665 or Office: (530) 462-4655	Ranger, District Liaison	9/13/2010	9/13/2010
Contact the Wilderness Society– Rich Fairbanks at 541-899-9558	Ranger, District Liaison	9/13/2010	9/13/2010
Meeting in Weaverville with Trinity County Board of Supervisors, Wilderness Society, Orleans Fire Safe Council, Citizens for Responsible Fire Management and Citizens for Better Forestry	Ranger, District Liaison	9/13/2010	9/13/2010
Contact the Trinity County Fire Safe Council – Pat Frost at (530) 623-6004	Ranger, District Liaison	9/23/2010	9/23/2010
The project was briefly discussed at the Trinity County Fire Safe Council meeting	N/A	10/28/2010	10/28/2010
Consultation initiated with local tribe. Contact the Hoopa Valley Tribe– Contact Tribal Relations Manager; Merv George in the RO at 707-562-8919.	District Ranger, District Liaison	11/03/2010	11/03/2010
Send scoping letter to mailing list – purpose and need, proposal and maps to interested parties, adjacent landowners, Tribes, Board of Supervisors, CDFG, USFWS, NMFS, and NCRWQC.	District Liaison	wk of 11/08/10	11/12/2010
Send news release to Redding Record Searchlight / Trinity Journal	District Liaison	11/12/2010	11/12/2010
Post scoping letter to Forest website.	District Liaison and Public Affairs Assistant	11/23/2010	11/23/2010

Public Participation Activity	Responsibility	Planned	Accomplished
Contact the Salmon River Restoration Council at 530-462-4665	District Ranger, District Liaison	11/23/2010	Left voicemail 11/23/2010
Contact the Klamath-Siskiyou Wildlands Center – at (541) 488-5789	Ranger, District Liaison	11/23/2010	Left voicemail 11/23/2010
Public meeting in Weaverville	District Liaison, Ranger	11/23/2010	11/30/2010
Public meeting in Willow Creek	District Liaison, Ranger	11/23/2010	12/01/2010
Northern CA Prescribed Fire Council- Fall Workshop	Alex McBath	12/03/2010	12/03/2010
Meeting between Forest Service, Trinity County Board of Supervisors and North Coast Unified Air Quality District	District Liaison, Ranger	1/13/2011	1/13/2011
Contact the Karuk Tribe	Mark Arnold	4/21/2011	4/21/2011
Consultation initiated with local tribe. Meeting with the Yurok and Hoopa Valley Tribe(s) and Tribal Relations Manager; Merv George	District Ranger	7/15/2011	7/15/2011
Meeting with Karuk Tribe	Mark Arnold	2/17/2012	2/17/2012
Meeting with Karuk Resources Advisory Board	District Ranger and Staff	9/04/2012	9/04/2012
Meeting with Karuk Tribe	Mark Arnold	November 2012	11/16/2012
Trinity County Board of Supervisors Meeting	District Ranger	May 2012	05/20/2012
Meeting with Karuk Tribe	Mark Arnold	March 2013	3/12/2013
Trinity Collaborative Group Meeting	District Ranger	September 2014	09/19/2014
Hoopa Valley Tribe Meeting	Forest Supervisor	March 2015	03/11/2015
Draft EA made available to the public for comment	IDTL, Ranger		July 25, 2019
Legal notice for 30-day comment period	IDTL, Ranger		July 25, 2019
Final EA and draft Decision Notice/FONSI made available to the public	IDTL, Ranger		
Legal notice for 45-day objection period	IDTL, Ranger		
Legal notice for final Decision Notice/FONSI	IDTL, Ranger		
Notice of Intent submitted to NCRWQCB	IDTL, Forest Hydrologist		

Content Analysis of Scoping Comments / Issue Disposition / Issue Indicators

Comments Received

The Forest Service received a total of five comment letters and emails during the scoping period. The comments were sent by a private individual, the Conservation Congress, the California Department of Fish and Wildlife, the Trinity County Board of Supervisors, and the Trinity County Historical Society. Five additional comment letters were received after the scoping period ended. These comments were submitted by two private individuals, the North Coast Unified Air Quality District, The North Coast Regional Water Quality Board, and Concerned Citizens for Responsible Fire Management.

Three comments expressed support for the overall objectives of the project. Some comments raised project-specific concerns about air quality, wildlife and fisheries, heritage resources, and the potential for escaped prescribed fire. Other comments offered recommendations for implementation of the proposed action. Some comments related to the NEPA process itself and to procedural concerns for effects analysis.

Eleven members of the public attended the open house meeting held for this project on September 13, 2010. Eight members of the public attended the open house meeting in Weaverville, CA on November 30, 2010; eight members of the public attended the open house meeting in Willow Creek, CA on December 1, 2010. The project was discussed at the Northern California Prescribed Fire Council fall workshop on December 3, 2010. Comments and concerns raised during the public meetings were considered in this analysis.

Comment letters are in the project record.

Issue Disposition Process

Issues are points of discussion, dispute, or debate about the effects of the proposed action. Alternative-driving issues are those that cannot be resolved through project design features but must be addressed through development of an alternative to the proposed action. The following process was used to sort through public input to determine which concerns rise to the level of issues, and to identify which issues drive development of additional action alternatives and which are analysis issues to be addressed in the EA.

Identify Concerns

Analysis of scoping comments identified concerns that were processed to determine if they are potential NEPA issues. Comment letters and other forms of input were tracked during processing, and to provide documentation for the project record.

Categorize Concerns

Comments and concerns were assigned to one of the following categories. Similar issues were grouped. This process is documented in Table C.2 below.

1. **Alternative-Driving Issue**. Alternative-driving issues generally concern resources that may be impacted by implementation of the proposed action and cannot be resolved through project design. An alternative-driving issue is addressed by development and analysis of an alternative to the proposed action.
2. **Other Issue**. Other issues are designated as such for any of the following reasons:
    a. The issue is already decided by law, regulation, Forest Plan or other higher level decision.
    b. The issue is outside the scope of the proposed action. The issue is not part of the proposal or is not affected by it.
    c. The issue is irrelevant to the decision to be made.
    d. The issue is conjectural and not supported by scientific or factual evidence.
    e. Other concern.
3. **Analysis Issue.** The issue is an analysis issue relevant to the proposed action but has limited duration or intensity of impacts or for which impacts have been resolved through project design features. Analysis issues are carried through effects analysis by project specialists – the analysis is documented in specialist reports to the project record and disclosed in the Environmental Assessment.
4. **Procedural Concern**. These are concerns that may be addressed through implementation of standard design features, or completion of processes routinely conducted by the interdisciplinary team. For example, concerns associated with aquatic resources may be addressed through application of Best Management Practices. It is common to receive scoping comments reminding us to consider or conduct certain processes, such as consultation with the State Historic Preservation Office (SHPO) or the US Fish and Wildlife Service (FWS), or cumulative effects analyses.
5. **Alternative**. The public may suggest an alternative, which is addressed in the environmental document. The alternative may be analyzed fully or, if it does not meet the purpose and need, rationale presented for why it was dropped from full consideration.
6. **Statement of Support.** The comment is a general statement of support for the proposed action.

Assign Indicators

Assign indicators to analysis issues; the indicators should be measurable, predictable, and responsive to the issue. Analysis issues identified related to air quality, soils and water quality, wilderness, recreation and fish and wildlife species and habitat.

Disposition of Scoping Comments

Table C.2 on the following pages displays the disposition of public comments received during the scoping period for the Trinity Alps Wilderness Prescribed Fire Project.

Table C.2. Content analysis and comment disposition, Trinity Alps Wilderness Prescribed Fire Project. See Table C.3 below for commenter identification

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
1	AIR QUALITY	04	…wants to know …how smoke impacts to the communities will be addressed.	**Analysis issue** • Air quality design features will be developed that minimize smoke impacts to communities. • The effects analysis for air quality will analyze smoke impacts to communities. • The No Action alternative addresses this issue (including the potential effects of No Action on air quality in the event of an unwanted wildfire).	**Project activities may cause adverse effects on air quality** • Predicted smoke emissions (PM_{10}, $PM_{2.5}$, and CO) from each alternative based on fuel loadings. • Coordination with State and local air quality districts and subsequent compliance through smoke management plans and monitoring procedures.
2	AIR QUALITY	07	Ignite north slopes 1-2 days prior to predicted rains to minimize…the number of days with smoke in the air.	**Procedural concern** • Ignition is based on fuel moisture levels and guidelines in the project-specific burn plan, not on amount of rainfall. • Project design features for air quality addresses this issue. • Effects analysis for air quality addresses this issue. • Important to disclose the potential effects of No Action on air quality in the event of an unwanted wildfire.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
3	AIR QUALITY	08	… want a detailed smoke management plan completed in the analysis.	**Procedural concern** • A smoke management plan would be prepared for project implementation to ensure compliance with all federal and state air quality regulations.	**N/A**
4	AIR QUALITY	13	All environmental effects that will impact public health and safety must be thoroughly analyzed in the proposed project analysis, including air quality. The agency must adhere to correct policy and guidelines in planning and implementation. The current project documentation does not contain adequate acknowledgement	**Procedural Concern** • Project design features for air quality would ensure compliance with applicable laws, policy and guidelines • Effects analysis for air quality addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
5	AIR QUALITY	16	A vital component of the analysis will be the duration and intensity or the burn. Smoldering lengthy burns create difficulty with ensuring community protection from smoke impacts. Wind direction changes, wind speed changes, precipitation and smoke dispersal are all critical components for every burn. The USFS will need to work closely with the District to determine the appropriate size of the proposed burn units for the various treatment actions. During project implementation, Smoke Management Plans will be required to be submitted well in advance for each proposed burn and Burn Authorizations must be obtained (District Regulation ll, Open Burning, Rule 208).	**Procedural concern / Other concern** • Project design features for air quality would ensure compliance with applicable laws and regulations. • Effects analysis for air quality addresses this issue. • The No Action alternative also addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
6	AIR QUALITY	19	We underwent severe stress and heavy smoke during the fire episodes in 1999, 2006, and 2008 and we do not want to suffer through this again. We need strong guarantees that this will not happen with your project.	**Other concern** • Project design features for air quality addresses this issue. • Effects analysis for air quality addresses this issue. • The No Action alternative also addresses this issue.	**N/A**
7	FIRE / FUELS	02	…the proposed action will not have the desired effects because of all the heavy down/dead fuels on the ground…	**Analysis issue/Procedural concern** • Project design features for fire / fuels addresses this issue. • Effects analysis for fire / fuels addresses this issue. • The No Action alternative also addresses this issue. • Prescribed fire would be carried out in compliance with an agency approved burn plan. Burn plans include specific parameters for weather and fuels conditions, and ensure compliance with state and federal air quality standards, with the intent to create primarily low- to moderate-intensity surface fires that would trend the project area toward the desired condition. Prescribed fire under these circumstances would safely reduce fuel accumulations while minimizing adverse effects to other resources."	**Project activities may not achieve the Project's desired effects.** • Predicted flame lengths during a wildfire event after implementation. • Predicted crown fire potential during a wildfire event after implementation.

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
8	FIRE / FUELS	07	Ignite north slopes 1-2 days prior to predicted rains to minimize control problems... Avoid spring burns in the wilderness…too much uncertainty with stump and large log holdovers.	**Procedural concern** • Timing of ignition is based on fuel moisture levels and predicted future rainfall as well as guidelines in the project-specific burn plan. • Project-specific burn plan with guidelines to reduce the risk of escaped prescribed fire would be prepared prior to implementation.	**N/A**
9	FIRE / FUELS	13	The proposal gives little information as to how proposed burns have been assessed for a specific area's resistance to control, should fire suppression become necessary. The EA needs to detail how spotting factors and fuel arrangement were considered in the modeling and analysis process. These issues are imperative, given the size of fires on this forest in the last decade, especially with regard to protecting communities and ensuring fire fighter safety.	**Procedural concern** • Analysis methodology for fire / fuels addresses this issue. • Effects analysis for fire / fuels addresses this issue. • The No Action alternative also addresses this issue.	**N/A**

10	FIRE / FUELS	02, 13	…wants to see…contingency plan activities analyzed in the EA. Based on previous reviews of other attempts to reintroduce fire into the ecosystem as a management tool, the County holds significant concern that this proposal needs to properly or adequately address how any serious fires that escape the prescribed fire proposed action will be remedied. Because the last decade has seen fires of a size and severity that far exceed the forest's and even the entire agency's ability to successfully and quickly suppress wildfire in this region, the County holds high concern over whether or not the Forest Service has the capacity to reasonably fight the fire that will likely result from this proposed action.	**Procedural concern** • The project burn plan will include an element describing contingency planning, which considers possible but unlikely events and the actions needed to mitigate those events. The project burn plan contains information regarding the amount and type of resources needed to keep the prescribed fire within the scope of the prescribed fire plan. Contingency resource needs are based, in part, on the tactics to mitigate events, values at risk, predicted fire behavior, and local knowledge and expertise of the area. • Ignition would be planned to reduce the risk and consequences of escaped prescribed fire (e.g. when current and predicted weather, fuel moisture and ground conditions would be most conducive to achieving the desired condition). • The No Action alternative also addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			This proposed action should contain information including how quickly, from where, and at what cost, fire crews will be available to suppress any fires that get out of control in the wilderness area. The proposed action should contain information relating to how adjacent communities will be impacted by likely escaped fires, how the communities will be utilized as staging areas, how community services will be incorporated into the fire fighting strategy at onset, and how local businesses will be utilized and incorporated into the same said strategy.		

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
11	FIRE / FUELS	16	…believes that the use of a modeling program, such as First Order Fire Effects Model (FOFEM), should include modeling for the unique fuel type/loading of the Trinity Alps Wilderness area. Given the terrain and variety of forest fuels, a correct analysis of the ignition duration and the duration of each burn unit is especially critical to managing smoke. This modeling should provide a better indication of the potential smoke impacts to affected communities.	**Procedural concern** • Analysis methodology for fire/fuels and air quality addresses this issue.	**N/A**

12	FIRE / FUELS	08, 13	…concerned that the Forest is prioritizing treatments in the wilderness over projects within the WUI and communities. They want to see an outline of the Forest's program of work for areas prioritized for fuel reduction. Why is this project a priority above fuel reduction projects in my backyard? How does this project fit into the Forest priorities for fuel reduction treatments? We should put the 5-year POW out to the public to explain how this project fits into this overall plan. … in light of the significant broad-scale fire danger across the Forest, questions the priority of treating the wilderness area over Wildland Urban Interfaces	**Other concern—Beyond the scope** • Fuel reduction projects around communities are ongoing and are a priority for the Forest. • Rationale for the proposed action (i.e. "Why here / why now?") will be disclosed in the EA. • Interaction of this project with other current and reasonably foreseeable projects within the cumulative analysis area for fire and fuels.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			(WUl). Information…shows fuel loading and arrangement around at least seven Trinity County communities which leave them susceptible to extreme fire danger should ignitions occur in those areas. What system of prioritization was utilized that indicates that the wilderness area proposed for treatment in this project is a higher priority than that of other areas in the Forest?		

13	FIRE / FUELS	08, 13	…concerned over the accuracy of fuel models being used, and that there is currently no good fuel models for heavy standing dead fuel. The fire modeling for this project appears to be fairly incomplete, and therefore, the County has grave concern that modeling outputs may have been based on an incorrect range of assumptions. Specifically, the proposal indicates that the modeling used to predict fire behaviors over this project do not include information from the Backbone Fire, one of the more recent wildfires, that has left a significant change to the landscape that should be considered when assessing how fire will behave in the proposed action. To our knowledge, there is no modeling of fuel types available that represents the high degree of fuel	**Other concern—Conjectural** • There are fuel models available that represent heavy downed woody debris. • The fire and fuels report will analyze for potential high intensity fire effects to resources.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			loading that exists on the landscape in the assessment area.		

14	FIRE / FUELS	08, 13	There is a fear that the project may create more of a fuel hazard as areas burn under high intensity and create more dead and downed fuel. Burning will only kill vegetation and not fully consume it, therefore leaving more dead fuels on the landscape to fall over and adding to the fuel loadings. How many entries we are doing and exactly how much do we expect to consume with these entries? Will the existing snags burn up? Will the dead and downed logs burn up? Will more dead fuels be created (explain the tradeoffs)? …supports the notion that the forest, both in this proposed project area, and on the forest as a whole, should be returned to its	**Other Issue/Conjectural / Analysis issue** • Project design features for Fire / Fuels for timing of ignition to achieve the desired condition with regard to consumption of vegetation. • Fire / Fuels effects analysis addresses this issue. • The second commenter offered no alternative to the proposed action for achieving the desired condition or meeting the stated purpose and need for the project. • The Forest Service did not state and does not agree that the project area is "too fuel-laden to support fire as an ecosystem management tool". • The No Action alternative also addresses this issue.	**See response to comment #7 above**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			more natural, fire-resistant state, it does not seem that using prescribed fire is necessarily the correct treatment. …it seems that setting any more fires in forested areas that are too fuel-laden to support fire as an ecosystem management tool will provide outcomes that are not consistent with the intended outcomes of the proposed action, i.e., large-scale fire that will devastate the ecosystem.		
15	FIRE / FUELS	20	How can you adequately plan this project with virtually no on-the-ground data? When will you actually gather any on-the-ground data, before or after this E.A. is completed?	**Other concern** • During the fall of 2013 fire and fuel planners spend 4 days in the project area field verifying fuel loadings, treatment units and past suppression features (helispots, dozer and hand lines, etc). • See the Vegetation/Fire and Fuels Report for more information.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
16	FIRE / FUELS	20	…it is well accepted by Forest and County officials and many involved publics that there is an enormous backlog of high and very high priority fuels projects. The highest priority of these projects are near established communities. In our view the Shasta Trinity Forest's scarce fuels treatment dollars should be allocated to the high priority projects near communities as opposed to a remote comer of the Trinity Alps Wilderness.	**Other concern—Outside the Scope** • Fuel reduction projects around communities are ongoing and are a priority for the Forest. • Rationale for the proposed action (i.e. "Why here / why now?") will be disclosed in the EA. • Interaction of this project with other current and reasonably foreseeable projects within the cumulative analysis area for fire and fuels.	**N/A**

17	FIRE / FUELS	10, 13	There was concern over burning in areas that have a high concentration of standing dead snags (from past fires), and that fire in these areas will burn too intense and be very difficult to control. There are acres and acres of standing dead trees on Megram Ridge and those will burn too hot and cause resource damage and could escape. Using psd (plastic sphere dispenser) is dangerous because fire lighted may be difficult to control. The fire history within the Alps Wilderness area historically kept fuel loads at low levels, allowing for fire as a reasonable tool in forest management… With the advent of fire suppression after the institution of the national forest system, fuel loads are now as much as 20	**Procedural concern / Other concern** • Analysis methodology for fire / fuels addresses this issue. • Project design features for fire / fuels addresses this issue. • Discussion of current and historic conditions addresses this issue. • Effects analysis for fire / fuels addresses this issue. • The No Action alternative also addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			times heavier throughout the forest, and simply will not sustain fire as a fuel management activity the way it once did.		
18	FIRE / FUELS	02, 12, 13	…wants to know more about the fire/fuel modeling used regarding heavy downed fuel and brush. Fire modeling shows the proposed treatment areas currently have relatively high burn probabilities and high fire behavior potential. What model is being used? What is the accuracy rating for the model? Has any Forest staff actually ground-truthed the proposed treatment areas? The EA must satisfactorily articulate how fuel loading was modeled, or how the fire prescription intends to work in connection with those high fuel loads	**Procedural concern** • Fire/fuels analysis methodology addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
19	FIRE / FUELS	18, 20	…a factual or numeric set of desired conditions should be established as the goal for this project. Without such factual stated goals there will be little to no way to judge the success or failure of this project. Only then can one determine if this type of work should be continued or discontinued. Such stated goals could be in Tons/ Ac, fuel loading, reduction in fire severity ratings, etc.	**Procedural concern** • Rationale for the desired condition (based on fire history, current conditions, and resources at risk) addresses this issue. • Issue indicators for fire and fuels include predicted flame lengths and crown fire potential.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
20	FISHERIES	08, 14	…have concerns over the effects to…fisheries resources… Identify sensitive species of fish…(including state-listed species) that would benefit from the proposed project. Identify sensitive species of fish…(including state-listed species) for which habitat suitability would be reduced by the project. Identify and map sensitive species or nests (including state-listed species) that have been observed in the plan area. Describe surveys that have been conducted for sensitive species.	**Procedural concern** • Existing conditions for fisheries addresses this issue. • Project design features for fisheries addresses this issue. • Effects analysis for fisheries (combine with aquatics analysis) addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
21	FISHERIES	18, 20	In your planning for this project, I would expect to see every consideration given to the status of maintaining a healthy river ecosystem. This includes maintaining river flows, reducing flash flows due to burned over upper slopes' and especially minimizing any impacts on the stream temperatures during summer flows. This of course means not impacting the streamside shading where it occurs.	**Procedural concern** • Existing conditions for fisheries addresses this issue. • Project design features for fisheries addresses this issue. • Effects analysis for fisheries (combine with aquatics analysis) addresses this issue. • Project design features for hydrology addresses this issue. • Effects analysis for hydrology addresses this issue. • Existing conditions for hydrology addresses this issue.	**N/A**
22	FOREST PLAN AMENDMENT	01, 08	…it's a bad decision to only do a project level plan amendment…it would be better to do a Forest Plan amendment for the entire wilderness. Why not do a Forest Plan amendment for the entire wilderness area and not just this project?	**Other concern – outside the scope** • The Forest will follow Forest Plan direction and Forest Service Manual policy.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
23	FOREST PLAN AMENDMENT	12	The Forest is incorrect regarding a project-level forest plan amendment…the Manual gives no authority to Forest Supervisors under FSM 5140.42 to oversee prescribed burns in wilderness areas. In fact the 5100 Code refers the Supervisor to FSM 2324 for prescribed fires in wilderness requiring Regional Office approval.	**Other concern – outside the scope** • See response to comment #22 above.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
24	FOREST PLAN AMENDMENT	08, 13	We should have the Regional Forester sign amendments for all R5 Forest Plans giving Forest Supervisors direct authority to burn in wilderness areas. What makes this amendment "non-significant"? This project does not qualify for a non-significant forest plan amendment, as the proposed action, by its own qualification, states that it will or may impact a three-forest area. The proposed action should be a Regional-level plan….	**Other concern – outside the scope** • See response to comment #22 above.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
25	HERITAGE RESOURCES	15	Fire can and does adversely affect both historic and prehistoric sites. Fire can cause damage through: (t) direct effects of the fire; (z) ground disturbing suppression activities; and/or (3) erosive movement caused by subsequent storm precipitation.	**Analysis issue** • Pre-treatment surveys for cultural properties address this issue. • Project design features for heritage resources, including Minimum Impact Suppression Techniques (MIST) addresses this issue. • Effects analysis for heritage resources addresses this issue.	**Project activities may cause undesired or adverse effects to heritage resources.** • Effectiveness of protection measures incorporated into project design features.
26	HERITAGE RESOURCES	15	It is extremely important for your project to locate and inventory all these [historic and prehistoric] sites and protect them.	**Procedural concern** • Project design features for heritage resources, including MIST address this issue. • Effects analysis for heritage resources addresses this issue.	**N/A**
27	HERITAGE RESOURCES	19	The historic and prehistoric features and artifacts to be found in the upper New River need to be located, recorded, and protected …Prescribed fire and any ground disturbance by hand tools all can and do harm historic and prehistoric properties and artifacts.	**Analysis issue** • Project design features for heritage resources, including MIST address this issue. • Effects analysis for heritage resources addresses this issue.	**See response to comment # 25 above**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
28	HERITAGE RESOURCES	19	An in-depth inventory and report on the heritage resources of the upper New River drainage actually would be a benefit provided by this project.	**Procedural concern** • See response to comment # 26 above.	**N/A**
29	NEPA	10	…asked about the reference period we were referring to when describing the "historical role" or "historical norm" that fire played in the Alps.	**Procedural concern** • Historical conditions with regard to fire generally refer to conditions before the modern fire suppression era, or before 1900.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
30	NEPA - DESIRED CONDITION	12	The scoping notice states the desired condition should include an "acceptable level" of wildfire (the Forest needs to define "acceptable level" in the EA; fuels conditions must permit fire behavior that enables suppression tactics and "minimum" suppression techniques [define "minimum"]; and lightning-caused fires play their natural ecological role with an appropriate suppression response ranging from confinement to control [conflict – if confinement and control then not natural]…	**Procedural concern** • The EA will describe acceptable levels of wildfire as related to air quality, the wilderness experience and risk to adjacent communities and public resources. • Minimum Impact Suppression Techniques (MIST) are described in Chapter 2 of the EA.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
31	NEPA – DESIRED CONDITION	18, 19, 20	… what is really a natural condition for this particular area? …challenge you to prove exactly what that "more natural condition" really is.	**Other concern** • Historical data on fire frequency and severity for vegetation types in the project area and for the project area itself were considered in the Forest Service's description of a "natural condition" for the project area. • The Forest Service recognizes that the desired condition must balance the need to maintain wilderness values with the need to protect communities and resources at risk.	**N/A**
32	NEPA - EIS	13	The proposed action should …be at the level of an Environmental lmpact Statement, per NEPA guidelines.	**Procedural concern** • Preparation of an EA will lead to either a DN/FONSI or preparation of an EIS, depending on the significance of predicted effects of the proposed action.	**N/A**
33	NEPA – PUBLIC INVOLVEMENT	16	it is extremely important that the USFS solicit input from the public in the best methods possible, especially in light of any negative public perception of past prescribed fire projects. We encourage the USFS to do as much outreach and education as possible to ensure public participation.	**Procedural concern** • The project public participation plan details planned and accomplished public notifications, public meetings and other outreach.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
34	NEPA - SCOPING	02, 03	He wants a longer scoping period (at least 90 days). [She] agrees that a longer scoping period would be better.	**Procedural concern** • Because comments on the proposed action will be accepted until the draft EA is released, the Forest Service determined that the 30-day scoping period is adequate. After the draft is released there will be another opportunity for the public to comment on this proposal.	**N/A**
35	NEPA - SOCIO-ECONOMIC ANALYSIS	08, 13	… want to see a social/economic analysis completed as part of the process. The assessment needs to ensure a degree of socio-economic analysis as to the impacts that can be anticipated from the smoke originating from the proposed action, and that from any fire that become large-scale as a result. How does the Forest Service plan to work with local governments and communities and businesses who are dependent upon good air quality to draw in their customers or consumers?	**Procedural concern/Other concern** • Project design features to reduce the potential for socio-economic effects from adverse air quality and to reduce the risk of "large-scale" fire resulting from the proposed action address this issue. • The No Action alternative also addresses this issue. • See response to comment # 4 and 5 above.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
36	NEPA – SOCIO-ECONOMIC ANALYSIS	13	How does the agency plan to address the large-scale impacts when any of these fires under the proposed action become large-scale fires?	**Other concern – Conjectural** • The assumption that implementation will result in large scale fires is conjecture. • Project design features include a project burn plan to reduce the risk of escaped prescribed fire (e.g., fuel moisture conditions, current and predicted weather, and season of ignition).	**N/A**
37	OTHER	02, 05	…wants to see the use of fire retardant …analyzed in the EA. …wants the use of fire retardant analyzed in the EA (contingency plan).	**Other issue – beyond the scope** • The Forest Service has completed a Final Environmental Impact Statement and, in December 2011, released a Record of Decision (ROD) for the continued nationwide aerial application of fire retardant on National Forest System lands. The Final Environmental Impact Statement is available here: http://www.fs.fed.us/fire/retardant/eis_info.html. • The use of fire retardant is not proposed in this project.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
38	OTHER	10	…disappointed in the way the meeting/project was advertised We just heard about this meeting today from a partner, not the Forest Service. Nothing in our local paper, no communication with our Fire Safe Council.	**Other concern** • The Forest could have done a better job communicating with the "downriver" communities. The Forest asked for some contact information so we can do a better job getting the word out on future projects and implementation.	**N/A**
39	OTHER	10	Someone asked about aerial seeding with conifer seeds after past wildfires.	**Other concern – beyond the scope** • Reforestation from past wildfires is not a part of the purpose and need for this project.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
40	OTHER	15	In your report you refer to "North Fork Creek." We think you mean "North Fork of Eagle Creek" as this specific branch is part of the Eagle Creek system which is a tributary to Slide Creek, An analogy is the North Fork of the Trinity River. This is not called North Fork Creek as a separate stream but is called just "North Fork" locally with the knowledge that its full title is as part of the Trinity River. On your "Proposed Treatment" map we notice that you show Slide Creek where the Eagle Creek watershed is. We are hoping you can rectify this in your present report and future reports.	**Other concern** • The requested corrections will be made.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
41	OTHER	19	I…looked at the revised map in the report in the Shasta-Trinity webpage and discovered that, Slide Creek was located where Eagle Creek should be. Additionally, "North Fork Creek" is used in your report, and this is not an accurate depiction of the "North Fork of Eagle Creek.	**Other concern** • The requested corrections will be made.	**N/A**
42	PROJECT IMPLEMENTATION	04	…wants to know about emergency access routes within the project area…	**Other concern** • The project-specific burn plan would address emergency access.	**N/A**
43	PROJECT IMPLEMENTATION	05	He…wants to see the Regional Office, Tribes and the communities involved regarding funding this project.	**Other concern** • Potential funding sources for project implementation are not relevant to the NEPA analysis; however, cooperative funding may be pursued if needed.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
44	PROJECT IMPLEMENTATION	07	No ignition until the first predicted fall storm for the area to be ignited, with at least 2" of rain predicted. Ignite South, east or west anytime after at least 4" or rain have accumulated during the fall. Utilize ridges for ignition and allow fire to back down through fuel accumulations. Utilize drying periods in Jan. or Feb. when south slopes have dried enough to carry fire to broadcast burn through brush fields. Utilize helicopter ignition but also use hand held drip torches to cover more areas during the very limited burn day opportunities.	**Other concern** • Ignition is based on fuel moisture levels and guidelines in the project-specific burn plan, not on amount of rainfall. Rainfall does affect these indices, both in terms of successful ignition and ability to control the prescribed fire. • Use of helicopter ignition and hand ignition are part of the proposed action. • The Minimum Resource Decision Guide (MRDG) addresses this issue.	**N/A**
45	PROJECT IMPLEMENTATION	08	…what [is] the timeframe…to complete the EA and start implementation.	**Other concern** • The Forest Service plans to release the draft EA in the summer of 2019 and begin implementation in the fall of 2020 or 2021.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
46	PROJECT IMPLEMENTATION	08	… want a local (public) presence during project implementation.	**Other concern** • The Forest Service will explore opportunities for a public presence during project implementation.	**N/A**
47	PROJECT IMPLEMENTATION	10	Someone asked whether the existing/created fire lines would be available as trails or for recreational use.	**Other concern** • Cross country travel in the wilderness is permitted, however no new trails would be created by this proposal. • Existing fire lines that have not had maintenance completed for many years could be treated for access and used as fire lines during implementation.	**N/A**
48	PROJECT IMPLEMENTATION	09, 10	…wanted to know about the coordination efforts with the Six Rivers and Klamath N.F. because the project boundary borders all three Forests. ....asked Six Rivers and Klamath NF were involved in this project.	**Other concern** • The Forest Service is sharing info with Six Rivers NF personnel; Six Rivers expressed an interest in doing a similar project, but this project is not a coordinated effort between all three Forests. • The FS has contacted the Klamath NF regarding this project and the Forest has shown interest and support.	**N/A**
49	PROJECT IMPLEMENTATION	18, 20	… how many treatments and how close together do you realistically need or plan to do?	**Other concern** • See Chapter 2 for a complete description, including maps, of the proposed action alternatives.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
50	PROPOSED ACTION	19	…we don't believe the Trinity Alps Wilderness Prescribed Fire Project should be implemented as your report now proposes. There needs to be a valid plan to adequately and immediately suppress the fire should it get out of bounds, including using retardant.	**Procedural concern** • A project burn plan would be prepared before implementation of any phase of the proposed action; this plan would address the potential for escaped prescribed fire and the measures that would be used to suppress escaped fire.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
51	PROPOSED ACTION	18, 20	I DO NOT AGREE with 1) the need for the vegetative modifications for the Salmon Mountain to Election Gap portion in its entirety, 2) any broadcast burning of the side slopes within the project area any further that 500 feet from the top of the ridge… At best the burning of large heavy fuels along the Trinity Divide (Salmon Summit to Fawn Ridge) seems to be the only real positive idea in this entire proposal. I do not believe in the need for vegetative modification based on an assumption of protecting the TAW from fire coming from outside the TAW, which appeared to be the primary reason for the Salmon Mountain to Election Gap portion of the project.	**Other concern** • The no action alternative addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
52	PUBLIC AWARENESS	08	We should make brochures regarding our accomplishments and put it out to the public. Put success stories in the newspaper. Send them to Congress too.	**Other concern – beyond the scope**	**N/A**
53	RECREATION	08	have concerns over the effects to…recreation/hunting.	**Other concern** • Project design features for recreation addresses this issue. • Effects analysis for recreation addresses this issue. • The No Action alternative also addresses this issue.	**N/A**
54	SOILS	08, 12	…have concerns over the effects to soil resources… If 67% of the Alps has already burned and fire suppression activities have occurred, what condition are the soils in?	**Procedural concern / Other concern** • Design features for soils addresses this issue. • Effects analysis for soils addresses this issue. • The No Action alternative also addresses this issue.	**N/A**
55	STATEMENT OF SUPPORT	01, 07	I agree that using fire in the Wilderness may provide benefits.	**Statement of support**	**N/A**
56	STATEMENT OF SUPPORT	06	…called into the meeting and says he is all for all for this project.	**Statement of Support**	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
57	STATEMENT OF SUPPORT	11	(He was in support of prescribed fire within wilderness and referenced a fire use project on the Sierra NF)	**Statement of support**	**N/A**
58	STATEMENT OF SUPPORT	15	The Trinity County Historical Society agrees that it would be beneficial to remove heavy fuel loads within the Trinity Alps Wilderness Area, if the prescribed burns are implemented in the right season of the year with the right conditions and adequate personnel on the ground.	**Statement of support**	**N/A**
59	VEGETATION	20	An additional concern is that much of this area has been exposed to the fires of 1999, 2006 and 2008. Repeated fires have the strong likelihood of causing type conversions. Frequent burning will change the vegetative types from the present mixed conifer forest to grass or brush by eliminating any local tree seed sources.	**Other concern** • Project design features for fire and fuels, and the effects analysis for vegetation addresses this issue. • Objectives of the proposed action are for mostly low- to moderate-intensity fire, which would not result in conversion of mixed conifer forest to grass or brush.	**N/A**

60	WATER QUALITY	17	In order to receive coverage under the 2010 *Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region*], the project must meet specific eligibility criteria and comply with the conditions contained within Order No. R1-2010-0029. In general, project mitigation measures should be designed to minimize and/or reduce cumulative impacts to below the threshold of concern upon completion of the project. Additionally, the EA should take into consideration the Basin Plan temperature objectives and staff recommendations for meeting those objectives…project must	**Procedural concern** • Project design features for hydrology and soils would be implemented to reduce cumulative impacts and to ensure compliance with the 2010 Waiver. • The No Action alternative also addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			be designed and implemented to meet the water quality standards outlined in the Basin Plan Measures to mitigate water quality impacts should be included in the design of the…project.		
61	WATER QUALITY	17	…after the Project Decision Notice is signed and at least 30 days prior to commencement of on-the-ground activities, a Notice of Intent (NOl) and Waiver Application shall be filed with the Regional Water Board	**Procedural concern** • The Forest Service would file a NOI and Waiver Application as required prior to project implementation.	**N/A**

62	WATER QUALITY	17	Measures to mitigate water quality impacts should be included in the design of the…project. "USFS shall include within the environmental document … the specific on-the-ground prescriptions that are designed to meet the USFS BMPs. Any contract(s) associated with this project should list the best management practices (BMPs) to be employed and include a discussion of the following: Wet weather operation standards; The width of the streamside management zones along riparian areas (when present); Erosion control measures to be implemented on areas disturbed by project activities covering both summer and winter periods; and,	**Procedural concern** • Project design features for water quality address this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			Evaluation and delineation of unstable areas including protection measures to be used in conjunction with activities on or near unstable areas.		
63	WATER QUALITY	17	The Environmental Analysis (EA) for this proposed project should contain a cumulative watershed effects analysis. When there are watersheds that are above, or proposed to be elevated above, established thresholds of concern there should be a thorough discussion of the cumulative impacts.	**Procedural concern** • Cumulative effects analysis for hydrology will include a CWE analysis.	**N/A**
64	WATER QUALITY	08, 12	… have concerns over the effects to watershed/sedimentation… If 67% of the Alps has already burned and fire suppression activities have occurred… what impacts have occurred to watershed values at the 7th/8th field, as well as the 5th field?	**Procedural concern** • Design features for water quality addresses this issue. • Cumulative effects area for the project water quality analysis will be described in the EA. • The No Action alternative also addresses this issue.	**N/A**

65	WILDERNESS	10, 12	The public doesn't want the wilderness touched - we want to let it burn. These P&N are inherently in conflict with the Wilderness Act of 1964 because they require managing the area to control fire. Page 3 of the scoping notice cites two sections of the Wilderness Act that the proposed P&N will conflict with. None of these desired conditions are conducive to maintaining wilderness values. Wildfire is natural so why do the risks and consequences of wildfire need to be managed? Creating specific fuel conditions to control how wildfire burns is management and not natural. Permitting lightening [sic] caused fires, as nearly as	**Analysis issue** • The Forest Plan currently does not allow for anything other than a full suppression response to all fires on the Forest, wilderness or not. • The Forest Service has management responsibilities in wilderness – the Wilderness Act does not mandate a hands-off approach. • Project design features (including MIST) to maintain or enhance wilderness values while responding to the needs of adjacent communities with regard to smoke management and risk of escaped wildfire addresses this issue. • Effects analysis will disclose how the project area has deviated from "natural" fuel levels after a century of fire suppression. • Effects analysis will disclose the effects of the proposed action on wilderness values and compliance with the 1964 Wilderness Act. • The No Action alternative addresses this issue.	**Project activities may cause undesired effects on wilderness values and character** • Achievement of assigned visual quality objectives. • Compliance with the Wilderness Act of 1964. • Duration and intensity of noise disturbance.

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			possible….is not allowing natural caused fires to burn naturally.		

66	WILDLIFE	12, 14	What condition is the habitat in that the Alps provides? What species are using this habitat? What level of fragmentation has occurred and what condition are wildlife corridors in? Have any surveys been conducted for any TES species in the Alps? (1) Identify sensitive species of…wildlife (including state-listed species) that would benefit from the proposed project. (2) Identify sensitive species of…wildlife (including state-listed species) for which habitat suitability would be reduced by the project. (3) Identify and map sensitive species or nests (including state-listed species) that have been observed in the plan area.	**Procedural concern** • Analysis methodology for wildlife analysis addressed this issue – identify suitable habitat for species where surveys have not been conducted. • Existing conditions for wildlife addresses this issue. • Project design features for wildlife addresses this issue. • Effects analysis for wildlife addresses this issue.	**N/A**

#	Category	Commenter	Comment	Disposition	Issue / Issue Indicator(s)
			(4) Describe surveys that have been conducted for sensitive species.		

Table C.3. Commenter Identification, Trinity Alps Wilderness Prescribed Fire Project

Commenter No.	Commenter	Type of Comment
01	Rich Fairbanks – the Wilderness Society	Comment at public meeting on 9/13/10
02	Roger Jaegel – Trinity County Board of Supervisors	Comment at public meeting on 9/13/10
03	Susanne Baremore – Trinity County Board of Supervisors	Comment at public meeting on 9/13/10
04	Peter Brucker – Salmon River Restoration Council (SRRC)	Comment at public meeting on 9/13/10
05	Stan Stetson	Comment at public meeting on 9/13/10
06	Will Harding	Comment at public meeting on 9/13/10
07	Tom Walz	Scoping comment email dated 11/23/10
08	Comment by several unnamed people	Comment at public meeting on 11/30/10
09	Charlie Fitch	Comment at public meeting on 11/30/10
10	Comment by several unnamed people	Comment at public meeting on12/01/10
11	Rich Fairbanks	Comment at Northern California Prescribed Fire Council workshop on 12/03/10
12	Denise Boggs - Conservation Congress	Scoping comment letter dated 12/06/10
13	Judith Pfleuger - Trinity County Board of Supervisors	Scoping comment letter dated 12/07/10
14	California Department of Fish and Game	Scoping comment letter dated 12/08/10
15	Rod Plew – Trinity County Historical Society	Scoping comment letter dated 12/08/10
16	North Coast Unified Air Quality District	Scoping comment letter dated 12/09/10
17	Maggie Robinson - North Coast Regional Water Quality Board	Scoping comment letter dated 12/16/10
18	Charley Fitch	Scoping comment letter dated 1/04/11
19	Gay Berrien	Scoping comment letter dated 1/13/11
20	David Rhodes – Concerned Citizens for Responsible Fire Management	Scoping comment letter dated 1/22/11

APPENDIX D – MINIMUM REQUIREMENTS DECISION GUIDE

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS

DECISION GUIDE

WORKSHEETS

Trinity Alps Wilderness Prescribed Fire Project

". . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

– the Wilderness Act, 1964

STEP 1: DETERMINE IF ANY ADMINISTRATIVE ACTION IS NECESSARY.

Description: ***Briefly describe the situation that may prompt action.***

Large portions of fire-adapted ecosystems within the wilderness are in a state of significant departure from their historical (pre-suppression, pre-1905) fire regime. As a result of this lengthened fire return interval, large portions of the wilderness have recently experienced uncharacteristic wildfire behavior due to high fuel concentrations. The existing fuel condition poses a substantial risk of wildfires escaping from wilderness onto adjacent lands (including wildland urban interface areas), increased suppression costs, undesirable effects to wilderness resources (both tangible and intangible), and an increase in public health concerns over hazardous air quality conditions both within and outside the wilderness during wildfire events. The current fuel conditions preclude opportunities to permit future lightning-caused fires to play a more natural role in ecosystem processes in the wilderness. There is a need to restore these areas to more natural wildfire behavior and fire return intervals.

The current vegetation and fuels condition and the vegetation fire severity (the extent of effects to vegetation as a result of fire) resulting from recent wildfires serve as a measure by which to evaluate the effects of fire to underlying wilderness values such as undeveloped character, outstanding opportunities for unconfined access to recreation, scenery and naturalness.

The need for action in the project area evolved primarily from changes in fire regimes over the last century. Historically, mixed-severity fires in the area played a significant role in creating a high spatial complexity of vegetation, including openings of different sizes, forested stands that were generally more open and late-successional, closed-canopy forests. A century of fire suppression has resulted in uncharacteristically dense vegetation and high fuel loading, a decline

in wildlife forage and habitat diversity, and an elevated risk of high-severity, stand-replacing fires as evidenced by recent fire history described below.

In 1987 nine fires combined to burn approximately 35,000 acres within the Alps. A widespread lightning event created numerous fire starts over Washington, Oregon and California; many of the fires burned for months and covered very large areas. With so many fires burning near and within the wildland urban interface in the Pacific Northwest, remote and rugged wilderness areas such as the Alps were of lower priority for the limited fire suppression resources that were available. Persistent temperature inversions during times of atmospheric stability trapped smoke over large areas and created public health and safety concerns due to the hazardous air conditions. High-severity fire effects in the Alps during 1987 were primarily on south- and west-facing slopes and upper slope positions.

On August 23, 1999, four separate lightning fires joined to form the Big Bar complex This fire burned approximately 140,950 acres of timber and brush (over half of which was in the Alps) in 91 days and covered most of northern California with heavy smoke. Due to health and safety concerns related to smoke, evacuation advisories were issued by the local air quality management district to communities such as Hoopa, Denny, down river communities and Willow Creek. The fires exacerbated concerns over fires escaping the wilderness into nearby communities at risk. In addition, this was the highest severity fire complex in recorded history within the Alps in terms of large patches of high-severity fire over large areas. Approximately 47 percent of high-severity fire was in large (20 inches dbh or larger) conifer-dominated stands.

On July 26, 2006, lightning ignited the Bake and Oven fires in the Trinity Alps Wilderness. These fires grew together and merged with the Pigeon fire, which quickly spread north into the canyons above the Trinity River. These wildfires were managed as the Bar Complex. They burned for approximately 122 days and across 100,000 acres, almost 95,000 acres of which were within the Alps. High fire severity was primarily on south- and west- facing slopes and upper slope positions. The Bar Complex and affected several communities at risk. While most of the complex burned at low to moderate severity (see Table D.3 below), air quality standards exceeded the California Air Resources Board thresholds and many communities suffered long durations of hazardous air. Within the Trinity Alps Prescribed Fire Project area, the majority of high fire severity (approximately 70 percent) was in small (10 to 20 inches dbh) conifer- and shrub-dominated vegetation types.

On June 21, 2008, a series of lightning strikes ignited approximately 35 wildfires within and adjacent to the 2006 Bar Complex fires. Many of these fires grew together and were managed as the Iron/Alps Complex. These fires burned over 100,000 acres in approximately two months – over 30,000 acres of which were in the Alps - before full containment was achieved. Ten wildland fire fighters lost their lives while suppressing these fires. There were mandatory and voluntary evacuation advisories because of the threat of wildfire to homes and property. Fire effects were similar to those of the 2006 fire season, with most high fire severity confined to south- and west-facing slopes and upper slope positions. However, air quality standards again exceeded the California Air Resources Board thresholds in several communities.

In addition, past fire suppression has altered the undeveloped character and natural conditions in some portions of the project area (e.g., fire line construction resulting in felled trees with cut stumps visible along some of the ridgetops). There is a need to return these areas to a more natural character and to allow for less intrusive future fire suppression efforts.

To determine if administrative action is necessary, answer the questions listed in A - F on the following pages by answering Yes, No, or Not Applicable and providing and explanation.

A. Describe Options Outside of Wilderness.

Is action necessary within wilderness?

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

While fuel reduction projects outside the wilderness (such as the planned Down River Community Protection Project and the proposed Westside Restoration Project) would provide some protection to adjacent communities, they would not accomplish the needed reduction of fuels within wilderness boundaries to promote fire as an ecosystem process and to reduce the substantial risk of wildfires escaping from wilderness onto adjacent lands (including wildland urban interface areas surrounding communities such as Denny and Tribal lands).

B. Describe Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows or requires consideration of the Section 4(c) prohibited uses? Cite law and section.

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

Section 4(c) of the Wilderness Act of 1964 allows otherwise prohibited uses as necessary to meet minimum requirements for the administration of the area for the purpose of this Act. Per the Northern California Coastal Wild Heritage Act (PL 109-362):

> *Sec. 4. ADMINISTRATION OF WILDERNESS AREAS, Forest Service California.*
>
> *(e) FIRE, INSECT, AND DISEASE MANAGEMENT ACTIVITIES — (1) IN GENERAL — The Secretary may take such measures in the wilderness areas designated by this Act as are necessary for the control and prevention of fire, insects, and diseases, in accordance with— (A) section 4(d)(1) of the Wilderness Act (16 U.S.C. 1133(d)(1)); and (B) House Report No. 98–40 of the 98th Congress. (2) as provided in subsection 4(d)(1) of the Wilderness Act, the Secretary of concern may take such measures as are necessary in the control of fire, insects, and diseases, subject to such conditions as he deems desirable.*

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws?

Yes: ☐ **No:** ☒ **Not Applicable:** ☐

Explain:

There is no provision of any other federal law that requires implementing fuels reduction through prescribed fire in the Trinity Alps Wilderness.

D. Describe Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

U.S. Forest Service policies and directives specifically address the management of fire in wilderness.

FSM 2320.3 - Policy

1. Where there are alternatives among management decisions, wilderness values shall dominate over all other considerations except where limited by the Wilderness Act, subsequent legislation, or regulations.

2. Manage the use of other resources in wilderness in a manner compatible with wilderness resource management objectives.

3. In wildernesses where the establishing legislation permits resource uses and activities that are nonconforming exceptions to the definition of wilderness as described in the Wilderness Act, manage these nonconforming uses and activities in such a manner as to minimize their effect on the wilderness resource.

5. Because wilderness does not exist in a vacuum, consider activities on both sides of wilderness boundaries during planning and articulate management goals and the blending of diverse resources in forest plans.

FSM 2320.6 - The Wilderness Management Model and the Wilderness Act

"Where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy, convenience, commercial value, and comfort are not standards of management or use of wilderness."

2323.62 - Policy

4. Manage smoke from management ignited prescribed fires occurring in or adjacent to class I wilderness areas in a manner that causes the least impact on air quality related values (FSM 2324).

2324.04b - Regional Forester

The Regional Forester is responsible for:

2. Approving the use of prescribed fire on a wilderness by wilderness basis through approval of the appropriate management plan. The management plan sets forth the standards and guidelines for the use and application of prescribed fire and the methods of monitoring results.

2324.2 - Management of Fire

2324.21 - Objectives

The objectives of fire management in wilderness are to:

2. Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness.

2324.22 - Policy

1. Two types of prescribed fires may be approved for use within wilderness: those ignited by lightning and allowed to burn under prescribed conditions and those ignited by qualified Forest Service officers.

2. No fire may be ignited or allowed to burn without documented, preplanned, specified conditions.

3. Document specific objectives, standards, and guidelines for the control of wildfire and the use of prescribed fire within each wilderness (FSM 5100, 5150, and 5190) in a forest plan or, where the forest planning process has not been completed, in either an interim wilderness management or fire management area plan. Document specific direction for fire program implementation in the forest fire management action plan (FSH 5109.19).

6. Forest Service managers may ignite a prescribed fire in wilderness to reduce unnatural buildups of fuels only if necessary to meet at least one of the wilderness fire management objectives set forth in FSM 2324.21 and if all of the following conditions are met:

a. The use of prescribed fire or other fuel treatment measures outside of wilderness is not sufficient to achieve fire management objectives within wilderness.

b. An interdisciplinary team of resource specialists has evaluated and recommended the proposed use of prescribed fire.

c. The interested public has been involved appropriately in the decision.

d. Lightning-caused fires cannot be allowed to burn because they will pose serious threats to life and/or property within wilderness or to life, property, or natural resources outside of wilderness.

7. Do not use prescribed fire in wilderness to benefit wildlife, maintain vegetative types, improve forage production, or enhance other resource values. Although these additional effects may result from a decision to use prescribed fire, use fire in wilderness only to meet wilderness fire management objectives.

8. Do not use management ignited fire to achieve wilderness fire management objectives where lightning-caused fires can achieve them.

2324.23 - Fire Management Activities

Conduct all fire management activities within wilderness in a manner compatible with overall wilderness management objectives. Give preference to using methods and equipment that cause the least:

1. Alteration of the wilderness landscape.

2. Disturbance of the land surface.

3. Disturbance to visitor solitude.

4. Reduction of visibility during periods of visitor use.

5. Adverse effect on other air quality related values.

Locate fire camps, helispots, and other temporary facilities or improvements outside of the wilderness boundary whenever feasible. Rehabilitate disturbed areas within wilderness to as natural an appearance as possible.

2324.2 - Management of Fire

2326 - USE OF MOTORIZED EQUIPMENT OR MECHANICAL TRANSPORT IN WILDERNESS

2326.02 - Objectives

1. Accomplish management activities with nonmotorized equipment and nonmechanical transport of supplies and personnel.

2. Exclude the sight, sound, and other tangible evidence of motorized equipment or mechanical transport within wilderness except where they are needed and justified.

2326.03 - Policy

1. Ensure that Forest Service employees acquire and maintain necessary skills for primitive travel by foot, horse, canoe, or other nonmechanical means and the use of hand tools. For definitions see FSM 2320.5.

2. Do not approve the use of motorized equipment or mechanical transport unless justified as described in 2326.1. For definitions see FSM 2320.5.

Specify, for each wilderness, the places and circumstances in which motorized equipment, mechanical transport, or aircraft are necessary for protection and administration of the wilderness and its resources in the Forest Plan.

The Line Officer approving the use of motorized equipment, aircraft, or mechanical transport shall specify what uses of that equipment are suitable and will have the least lasting impact to the wilderness resource. Schedule use of this equipment to minimize impact on wilderness visitors.

SHASTA-TRINITY NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN

Forest Goals

The overall management philosophy of the Shasta-Trinity NF is to realize integrated multiple resource land management in the context of Ecosystem Management. Forest goals related to the proposed action include the following:

Fire and Fuels

4.10 - Restore fire to its natural role in the ecosystem when establishing the Desired Future Condition of the landscape (Forest Plan page 4-4).

4.11 - Achieve a balance of fire suppression capability and fuels management investments that are cost effective and able to meet ecosystem objectives and protection responsibilities (Forest Plan page 4-4).

Wilderness

4.6 (4.41) Manage Wilderness to meet recreational, scenic, educational, conservation, and historic uses while preserving wilderness values (Forest Plan page 4-6).

Standards and Guidelines

The Forest Plan provides Forest-wide direction and Management Area (MA) direction. Forest-wide direction applies to all management areas. Forest-wide and MA direction is detailed in Chapter 4 of the Forest Plan.

The following Forest Plan direction, standards and guidelines apply to the Trinity Alps Wilderness Prescribed Fire Project:

Fire and Fuels

Standard and Guideline 4.8a directs that wildland fires will receive an appropriate suppression response that may range from confinement to control. Unless a different suppression response is authorized in this Plan, or subsequent approved Plans, all suppression responses will have an objective of "control" (Forest Plan page 4-17).

Wilderness Management

Standard and guideline 4.24c directs the Forest Service to complete a Fire Management Plan for each Wilderness in two years, return fire to its natural role when not in conflict with public safety and permit fire management activities that are compatible with wilderness objectives (Forest Plan page 4-29).

Standard and guideline 4.24i directs the Forest Service to manage vegetation to retain the primeval character of the wilderness environment and to allow natural ecological processes to operate freely. Remove trees only under emergency conditions such as fire, or insect and disease control (Forest Plan page 4-29).

Standard and guideline 4.24m directs the Forest Service to maintain high air quality in class I wilderness areas (Forest Plan page 4-29).

Standard and guideline 4.D-3 (Management Prescription V) directs that wildfire suppression tactics will favor the use of natural barriers, topography or water courses, and low impact

techniques. After fires are declared out, take appropriate action to rehabilitate and/or restore the site.

Standard and guideline 4.D-5 (Management Prescription V) directs that use of prescribed fire from planned ignitions to perpetuate natural ecosystems, or to protect adjacent resources, may be undertaken only after Washington Office approval (Forest Plan page 4-33).

Standard and guideline 4.D-6 (Management Prescription V) directs the Forest Service to permit helispots when approved by the Forest Supervisor. Use natural openings to the extent possible (Forest Plan page 4-34).

Standard and guideline D-11 (Management Prescription V) directs that management activities should be compatible with Primitive Recreation Opportunity Spectrum (ROS) guidelines unless otherwise specified in approved Wilderness Management Plans (Forest Plan page 4-34).

Standard and guideline D-14 (Management Prescription V) directs that wilderness is to be managed to meet Visual Quality Objectives (VQOs) of preservation (Forest Plan page 4-34).

Standard and guideline D-15 (Management Prescription V) directs the Forest Service to maintain snags, dead/down material, and hardwoods at naturally occurring levels. Dead/down vegetation may be used in amounts that can be replaced annually through natural accumulation. Standing vegetation (green or dead) may not be used (Forest Plan page 4-34).

MA 4-D4 directs the Forest Service to develop a fire management plan which uses planned and unplanned ignition to restore and maintain natural conditions. When implementing this plan, maintaining air quality is an overriding consideration (Forest Plan page 4-95).

All page references in this document refer to the version of the Forest Plan available at the following Shasta-Trinity NF webpage:

http://www.fs.usda.gov/detailfull/stnf/landmanagement/planning/?cid=stelprdb5108815&width=full

SHASTA-TRINITY NATIONAL FOREST FIRE MANAGEMENT PLAN

Additional direction for management of both unplanned ignitions and prescribed fire is provided in the 2012 Shasta-Trinity National Forest Fire Management Plan[40] (FMP). Management of prescribed fire in the Wilderness Fire Management Unit, which includes the Trinity Alps Wilderness, is addressed on pages 22-27 of the FMP. The nearby community of Denny was identified as a Community at Risk in the plan (FMP page 36).

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: Untrammeled, Undeveloped, Natural, Outstanding opportunities for solitude or a primitive and unconfined type of recreation, or other unique components that reflect the character of this wilderness area?

[40] http://fsweb.shastatrinity.r5.fs.fed.us/fire/fire-management-plan/fmp.pdf.

Untrammeled: **Yes:** ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

In the context of the Wilderness Act, an untrammeled area is where human influence does not impede the free play of natural forces or interfere with natural processes in the ecosystem.

Fuel reduction using prescribed fire would allow greater use of natural topographical features in lieu of constructed fire lines to manage future wildfires and would improve opportunities to let the naturally ignited fires to burn, moving the wilderness toward a state where natural processes would operate more freely. Employment of less intrusive suppression techniques would likely reduce future trammeling associated with fire suppression.

Undeveloped: **Yes:** ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

As noted above, past fire suppression efforts left visible unnatural features (e.g., cut stumps and felled trees). Action is needed to mitigate these unnatural features. See Figure D.1 below.

Figure D.1. Salmon Summit ridgeline, Trinity Alps Wilderness (2009)

Fuel reduction is needed to allow the Forest Service to manage future wildfires in a less intrusive manner, with more opportunities to use topographic features and existing trails as fire lines rather than creating new fire lines.

Natural: **Yes:** ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

Fuel reduction is needed to safely re-introduce an important ecological process to ecosystems in the Trinity Alps Wilderness – primarily low- to moderate-intensity fire – and to facilitate a trend toward historic fire return intervals and fire behavior. Reduction of the unnatural accumulation of fuels is needed to reduce the risk that future wildfires would have uncharacteristically widespread adverse effects to wilderness resources.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation:

Yes: ☐ **No:** ☒ **Not Applicable:** ☐

Explain:

Opportunities for solitude or a primitive and unconfined type of recreation have been degraded in some portions of the Alps due to continued accumulation of uncharacteristically dense fuels and understory vegetation, both on and off trails. Restoring access to trails that have remained impassable for many years and reducing heavy accumulations of ground fuels would facilitate the ability of wilderness users to disperse throughout the landscape, thus improving opportunities for unconfined recreation and solitude.

Other unique components that reflect the character of this wilderness:

Yes: ☐ **No:** ☐ **Not Applicable:** ☒

Explain:

There are no unique qualities of this wilderness that are relevant to this situation.

F. Describe Effects to the Public Purposes of Wilderness

Is action necessary to be consistent with one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Recreation: **Yes:** ☐ **No:** ☒ **Not Applicable:** ☐

Explain:

Current conditions still allow for recreation opportunities as directed by the Wilderness Act of 1964, and do not require fuel reduction to maintain those opportunities. However, fuels reduction would enhance recreation in the long term by reducing unnatural fuel accumulations and dense understory vegetation that currently impede overland and trail travel in some areas of the wilderness.

Scenic: **Yes:** ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

The current fuels conditions in the wilderness increase the likelihood that, without treatment, future wildfires will burn with higher intensities over larger areas than historically occurred. This would result in uncharacteristically large expanses of burned-over forest, with thousands of acres of blackened, dead and dying trees.

In addition, action is needed to remove the evidence of past fire suppression efforts (e.g., cut stumps and felled trees visible along some ridgelines), and to promote the use of less intrusive future fire management techniques.

Scientific: **Yes:** ☐ **No:** ☒ **Not Applicable:** ☐

Explain:

There are no scientific uses of the wilderness that require fuel reduction.

Education: **Yes:** ☐ **No:** ☒ **Not Applicable:** ☐

Explain:

There are no educational uses of wilderness that require implementation of prescribed fire.

Conservation: **Yes:** ☒ **No:** ☐ **Not Applicable:** ☐

Explain:

Prescribed fire would reduce the unnatural accumulation of fuels and trend the project area toward historic fire regimes and fire return intervals. Restoring fire to the wilderness would have long-term benefits to the natural function of ecological processes and, therefore, the conservation use public purpose.

Historical use: **Yes:** ☐ **No:** ☒ **Not Applicable:** ☐

Explain:

There are no historical uses of wilderness that require fuel reduction. However, the current heavy fuel accumulations make Tribal access to cultural sites within the wilderness – either by trail or cross country – difficult.

Step 1 Decision: **Is any administrative action necessary in**

Yes: ☒ **No:** ☐ **More information needed:** ☐

Explain:

Based on evaluation of the response to questions A-F above it was determined that:

- actions outside the wilderness would not achieve fuel reduction objectives within wilderness boundaries;
- fuel reduction through prescribed fire is needed within the wilderness to meet special provisions of the wilderness act pertaining to the control and prevention of fires;
- no other legislation requires or prohibits fuel reduction through prescribed fire within wilderness;
- Forest Service policy and directives provide authority for conducting fuel reduction activities within wilderness;
- fuel reduction through prescribed fire is needed within the wilderness to preserve and enhance wilderness character; and
- fuel reduction through prescribed fire is needed within the wilderness to preserve the scenic integrity of the wilderness and to restore the natural function of ecological processes (e.g., fire).

The current vegetation and fuels condition and the vegetation fire severity (the extent of effects to vegetation as a result of fire) resulting from recent wildfires serve as a measure by which to evaluate the effects of fire to underlying wilderness values such as undeveloped character, outstanding opportunities for unconfined access to recreation, scenery and naturalness.

The need for action in the project area evolved primarily from changes in fire regimes over the last century. Historically, mixed-severity fires in the area played a significant role in creating a high spatial complexity of vegetation, including openings of different sizes, forested stands that

were generally more open and late-successional, closed-canopy forests. A century of fire suppression has resulted in uncharacteristically dense vegetation and high fuel loading, a decline in wildlife forage and habitat diversity, and an elevated risk of high-severity, stand-replacing fires, as evidenced by recent fire history described below.

The Forest Service has determined that fuel reduction using prescribed fire is needed to promote fire in the Alps as a natural ecosystem process, and to maximize the benefits of fire – and minimize its adverse effects – to wilderness resources while providing for firefighter and public safety. Because the agency recognizes the potential for short-term adverse impacts to wilderness resources and wilderness character, an Environmental Assessment will be prepared.

If action is necessary, proceed to Step 2 to determine the minimum activity.

STEP 2: DETERMINE THE MINIMUM ACTIVITY.

Please refer to the accompanying MRDG *Instructions* for information on identifying alternatives and an explanation of the effects criteria displayed below.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

Alternative 1 – No Action

Under this alternative, no fuels reduction activities would occur. Fuels in the wilderness would be allowed to accumulate untreated. The effects of past fire suppression would remain visible along some ridgetops. Left untreated, future fire suppression activities would be expected to occur.

Effects:

Wilderness Character

"Untrammeled"

Benefits

- None

Adverse Effects

- Taking no action to reduce the unnatural fuel accumulations resulting from years of fire suppression would preclude future opportunities for allowing lightning-caused fires (which would continue to be suppressed) to play a more natural role in wilderness ecosystems.

"Undeveloped"

Benefits

- None

Adverse Effects

- Existing fire lines along ridgetops would continue to bear the evidence of past fire suppression (e.g. felled trees and cut stumps) and would remain visible to wilderness visitors.

- Future wildfires in unnatural fuel accumulations would likely necessitate the use of more intrusive suppression techniques including new fire line construction and use of motorized equipment/mechanized transportation during suppression activities.

- Continued accumulation of untreated fuels would further restrict opportunities for future use of less intrusive fire management techniques (e.g. use of topographical features rather than constructed fire lines).

"Natural"

Benefits

- None.

Adverse Effects

- The current unnatural accumulation of vegetation, a direct result of human fire suppression, and lengthened fire return interval, as well as recent wildfire behavior, are not considered by the Forest Service to be natural. Under the No Action alternative, this condition would persist.

- The current conditions preclude opportunities to manage future wildfires as a natural ecosystem process. Under No Action, the benefits of future wildfires to wilderness resources are likely to be outweighed by their adverse effects.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation"

Benefits

- With No Action, there would be no disruption of solitude by noise from helicopters igniting prescribed fires or the presence of ground crews improving existing fire lines.

- With No Action, opportunities for solitude would increase if use of the area decreases due to the adverse effects noted below combined with effects to other wilderness values as discussed in this document.

Adverse Effects

- Current uncharacteristic fuels and vegetation conditions in portions of the project area make overland travel very difficult, thus diminishing opportunities for unconfined recreation. With No Action, this condition would persist.

- Opportunities for a primitive and an unconfined type of recreation may be impacted in the event of future widespread, severe wildfires. Such fires could necessitate long periods during which solitude would be disrupted by the presence of firefighters and noise from helicopters. Unconfined recreation could be disrupted due to area closures for public safety during wildfire events. As evidenced by recent fire behavior (see above), this disruption could last for weeks or months.

"Other unique components" that reflect the character of this wilderness

There are no unique qualities of this wilderness that are relevant to this situation.

Heritage and Cultural Resources

Benefits

- No short-term effects to heritage or cultural resources.

Adverse Effects

- Tribal access to cultural sites would remain an issue if the current heavy fuels are not addressed.
- Predicted future fire behavior would increase the risk that heritage and cultural resources within the project area could be damaged or destroyed by high-intensity/high-severity wildfire. In addition, because future fire suppression would likely require more intrusive techniques to achieve control than under an action alternative, there would be a greater risk of adverse effects to heritage and cultural resources.

Maintaining Traditional Skills

Benefits

- No change in current use of traditional skills for routine trail maintenance.

Adverse Effects

- Predicted future fire behavior would increase the likelihood that use of motorized equipment would be required for safe fire suppression (e.g. aerial firefighting using helicopters and ground crews using chainsaws to construct new fire lines and/or improve existing fire lines).

Special Provisions

- No effects to any special provisions of the Wilderness Act.

Economics and Timing Constraints

Benefits

- There would be no costs associated with No Action in the short term.

Adverse Effects

- With No Action, the cost of future fire suppression efforts would likely be higher. In addition, loss of revenue to local communities could occur in the event of protracted periods of heavy smoke from wildfires and area closures for public safety.

Additional Wilderness-specific Comparison Criteria

- There are no unique characteristics or criteria specific to this wilderness that would be affected by implementation of No Action.

Safety of Visitors, Personnel, and Contractors

Benefits

- There would be no immediate risks to safety of visitors, personnel or contractors if the no action alternative were implemented, since there would be no activities of the type proposed under the action alternatives.

Adverse Effects

- In the event of a future wildfire, there would be an increased risk to the safety of ground crews. Given recent wildfire behavior and the predicted behavior of future wildfires in the project area under No Action, firefighters could be exposed to this increased risk for protracted periods. If the level of risk to firefighters becomes unacceptable to fire managers, suppression efforts would be curtailed – which would increase the risk of widespread adverse effects to wilderness resources.

- Wilderness visitors could potentially be exposed to safety hazards associated with extreme wildfire behavior.

- There are inherent risks in use of helicopters for any purposes; however, those risks are managed to strict federal standards.

- Given recent wildfire behavior and the predicted behavior of future wildfires in the project area under No Action, there is a risk of protracted periods of poor air quality, which would pose a safety risk to firefighting personnel, wilderness visitors and nearby communities.

Alternative # 2 – Non-Motorized and Motorized Treatment – 16,709 acres

Under this alternative, prescribed fire would be implemented on approximately 16,709 acres using Minimum Impact Suppression Tactics (MIST). Fire would be ignited on ridgetops and would be predicted to back downslope approximately 1,000 feet. See Chapter 2 of the Environmental Assessment for a detailed description of Alternative 2.

Under this alternative, no new fire line would be constructed. In order to facilitate implementation of the proposed prescribed fire, approximately 32 miles of existing fire line would be improved[41] using non-motorized methods (ground crews using primitive tools such as crosscut saws, pry bars and manual grip hoists). Fire line improvement would include cutting and dispersal of downed fuels where needed and camouflaging stumps of trees felled during past fire suppression efforts. Danger trees that cannot be avoided would, wherever feasible, be blasted rather than cut to avoid the unnatural appearance of stumps. Danger trees that must be cut would be cut as close to ground level as practicable and the stumps covered with on-site native material.

The use of chainsaws during fire line improvement would be limited to situations in which it is determined that use of crosscut saws would be unsafe (e.g., felling of danger trees that cannot be safely avoided or otherwise neutralized). Such instances are predicted to be rare.

[41] Improvement of existing fire lines would be accomplished in order to implement the prescribed fire treatments proposed under this alternative. Ongoing fire line improvement is not anticipated or proposed and is, therefore, beyond the scope of the Trinity Alps Wilderness Prescribed Fire EA.

The ability to safely implement prescribed fire in rugged, remote terrain using non-motorized methods (i.e. ground crews) only is dependent on many variables (e.g., site-specific fuels conditions, weather conditions, and extent of the "burn window" – the period of time when other variables are conducive to safe and successful prescribed fire operations); unexpected changes in one or more of those variables could put ground crews at risk. Due to the existence of these variables, it is not possible to determine if ignition and management of prescribed fire on any portion of the project area by ground crews only could be safely conducted. The remoteness and steep, rugged terrain over most of the project area, when combined with current fuel conditions, present unacceptable safety risks to ground crews.

Where and when feasible, prescribed fire would be ignited and managed using ground crews. The determination of where and when to use ground crews would be made at the time of implementation; consideration would be on a site- and conditions-specific basis. Based on the factors noted above, we predict that such opportunities would be very limited.

In order to safely implement the proposed action and protect workers from unnecessary exposure to safety hazards, most or all prescribed fire would be implemented via aerial ignition. Helicopter flight time within wilderness would average approximately 4 to 5 hours in a given day, would be intermittent rather than continuous, and would be based on weather and burning conditions. Approximately two days of intermittent helicopter presence within wilderness per year for up to ten years are expected. Typically, one helicopter is used to ignite prescribed fire in the manner proposed.

Helicopters would not land within the wilderness except in cases of emergency that imperil workers or the public.[42]

Due to limited operating periods established for protection of wildlife and fish populations and to the seasonal occurrence of optimal conditions for prescribed fire, ignition is likeliest to occur during autumn (e.g., hunting season) and would not occur during summer when hiking and other recreational activities are most frequent. See Chapter 2 of the EA for a detailed description of all project design features related to aerial ignition.

Implementation of the proposed action would occur over approximately six to ten years. While this alternative would achieve fuel reduction objectives over most of the project area, the Virgin Creek drainage would remain untreated. The current fuels condition in that drainage poses a risk to firefighters and natural resources in the event of a future wildfire that may ignite or burn into that drainage. This risk would be lower than under Alternative 1 (No Action) because fuel treatments in the remainder of the project area would reduce the risk of future extreme fire behavior, but higher than under Alternative 3, which proposes additional ridgetop prescribed fire treatments in Virgin Creek drainage.

Effects:

Wilderness Character

"Untrammeled"

Benefits

- Fuel reduction through prescribed fire as proposed under this alternative would safely reintroduce fire to the project area as an ecosystem process and would provide future

[42] Wilderness Act of 1964, Section 3(c)

opportunities to permit naturally occurring wildfires to burn as Forest Service policies allow.

Adverse Effects

- Implementing prescribed fire in the wilderness would cause short-term widespread trammeling in the sense that prescribed fire is an intentional manipulation of an ecological process. This short-term "trammeling" would occur each year over a period of six to ten years. However, fire itself is a natural process within Trinity Alps ecosystems, and the visual and ecological effects of prescribed fire would be indistinguishable from those of a naturally-occurring fire.

"Undeveloped"

Benefits

- Use of primitive tools would be emphasized. Restricting chainsaw use to emergency situations or where there are safety concerns would allow most if not all fire line improvement to be conducted using non-motorized methods, while providing for worker and public safety. The instances of chainsaw use are expected to be rare.

- Prescribed fire as proposed in this alternative is expected to reduce the future occurrence of extreme wildfire behavior over most of the project area and increase the ability to manage future fires using natural topographic features, thus reducing the need for fire line construction or other tactics that diminish the undeveloped nature of the wilderness.

Adverse Effects

- Using motorized equipment (chainsaws and helicopters) in wilderness is inconsistent with the preservation of wilderness character as required by the Wilderness Act (Section 2(a) and 4(b)). Even short-term use of motorized equipment in wilderness negatively affects the undeveloped quality of wilderness. Under this alternative, such effects would be of short duration, and are considered a trade-off for the benefits of reducing the visual effects of past fire suppression and re-introducing fire as a natural ecosystem process, which would enhance the undeveloped character of the wilderness in the long term.

- Because the Virgin Creek drainage would remain untreated, future fire suppression efforts there may result in higher impacts to the undeveloped character of that drainage than under Alternative 3.

"Natural"

Benefits

- Long-term benefits to natural character would be expected with the safe re-introduction of fire to the wilderness as an ecosystem process.
- Improvement of existing fire lines to facilitate implementation of the proposed prescribed fire would include removing the unnatural, visible evidence of past fire suppression (e.g., felled trees and cut stumps).

Adverse Effects

- None

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation"

Benefits

- Opportunities for solitude or a primitive and an unconfined type of recreation would be improved over the long term as heavy fuel loads are reduced, not only along established trails that also serve as fire lines, but also with regard to overland travel.

Adverse Effects

- Opportunities for primitive and an unconfined type of recreation would be adversely affected in the short term as visitors are prevented from accessing portions of the wilderness during project implementation. The project area encompasses approximately 11 percent of the Trinity Alps Wilderness; of that amount, only about 10-20 percent (or one to two percent of the Wilderness) would be potentially affected in any given year.
- Some wilderness visitors may be negatively impacted by the sight and/or sound of helicopters or, on rare occasions, of chainsaws. As noted in the description of this alternative, helicopter presence within wilderness would average 4-5 hours per day, two days per year for up to ten years.

Other unique components that reflect the character of this wilderness

- There are no unique qualities of this wilderness that are relevant to this situation.

Heritage and Cultural Resources

Benefits

- Because project implementation would be predicted to reduce the future occurrence of extreme wildfire behavior over most of the project area, there would be a lower risk of adverse effects to heritage and cultural resources from extreme fire behavior than under No Action. In addition, because project implementation would allow future wildfire management utilizing less intrusive methods, risks to heritage and cultural resources from future fire suppression efforts would be lower than under No Action.

Adverse Effects

- There is a risk that some heritage and cultural resources could be damaged by prescribed fire; however, this risk would be mitigated through design features established by the project archaeologist. Effects to heritage and cultural resources under this alternative would be similar to those under naturally-occurring low- and moderate-intensity wildfires.

Maintaining Traditional Skills

Benefits

- Use of non-motorized tools and methods complies with the Minimum Requirements direction of the 1964 Wilderness Act, Section 4(c). Limiting the use of chainsaws to those rare instances when safety is an overriding concern would maintain the traditional skill of using of cross-cut saws and other hand tools as directed (e.g. FSM 2326.03). There would be an opportunity to train crews in the use of traditional skills and enhance their appreciation of their wilderness heritage. Ground crews may, if needed, be supported by pack stock, which would maintain that traditional non-motorized method.

Adverse Effects

- Under this alternative, although motorized use is limited to those occasions when crosscut saws are unable to safely accomplish work and to when helicopter ignitions are necessary because conditions are too risky for ground crew ignitions, not all work would be accomplish using traditional skills. This effect is greater as compared to alternative 4, but slightly less than alternative 3.

Special Provisions

- There are no beneficial or adverse effects to special provisions of the Wilderness Act from implementation of fuel reduction activities as proposed under this alternative.

Economics and Timing Constraints

Benefits

- The estimated cost per acre for aerial ignition of prescribed fire using helicopters is $25.57. While safety rather than economics was the overriding factor in the proposal to use motorized and non-motorized methods to accomplish project objectives, the lower cost of this alternative than Alternative 4 (non-motorized methods only) would be an additional benefit.

- Implementation of this alternative would likely reduce the costs of future fire suppression.

- The optimal “window” for successful prescribed fire can be limited in any given year and relies on factors such as current and predicted weather and fuel moisture. Aerial ignition using helicopters would optimize the time available and increase the probability that project objectives would be met from year to year. Optimizing the time available would also reduce the duration of impacts to wilderness visitors and wilderness resources.

Adverse Effects

- The noise from helicopters, presence of ground crews with possible occasional chainsaw use, area closures and the presence of smoke could adversely impact wilderness activities such as hunting and hiking. A reduction in these activities could, in turn, adversely impact revenues to local communities.

Additional Wilderness-specific Comparison Criteria

- There are no unique characteristics or criteria specific to this wilderness that would be affected by the implementation of any alternatives.

Safety of Visitors, Personnel, and Contractors

Benefits

- The use of chainsaws on a site-specific and situation-specific basis during fire line improvement may be determined to be safer for personnel than use of cross-cut saws. Use of chainsaws during project implementation is predicted to be rare.

- The use of helicopters for aerial ignition would greatly reduce the risk to personnel during implementation of prescribed fire, when conditions are not safe for ignitions by ground crews. Helicopter ignition would reduce or eliminate exposure of ground crews to the risks of managing prescribed fire in steep, rugged and remote terrain, particularly given the current fuel conditions in the project area.

Adverse Effects

- There is an increased safety risk for workers when chain saws are used based on the frequency and severity of accidents.

- There are typical risks to workers from use of crosscut saws, traveling to the work site, and camping in wilderness.

- There are inherent risks in use of helicopters for any purposes; however, those risks are managed to strict federal standards.

Alternative # 3 – Non-Motorized and Motorized Treatment – 19,088 acres

Under this alternative, the proposed treatments would be the same as under Alternative 2, except that an additional 2,379 acres in the Virgin Creek drainage would also be treated with prescribed fire. There would be no additional fire line improvement beyond that proposed under Alternative 2. No new fire line would be constructed. Design features that specify MIST and use of chainsaws and helicopters for safety and timing considerations under Alternative 2 also apply to this alternative.

The Forest Service determined that treatment in the Virgin Creek drainage is needed in order to moderate future fire behavior throughout the project area. As with Alternative 2, helicopter flight time within wilderness would average approximately 4 to 5 hours in a given day, would be intermittent rather than continuous, and would be based on weather and burning conditions. Approximately two days of intermittent helicopter presence within wilderness per year for up to ten years are expected.

Effects: Essentially the same as for Alternative 2, except for the following:

Wilderness Character

"Undeveloped"

Benefits

- Inclusion of the additional treatments in the Virgin Creek drainage would enhance the ability of firefighters to manage future wildfires using natural barriers such as topography, thereby reducing or eliminating the need for fire line construction over a larger area than under Alternative 2.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation"

Benefits

- Opportunities for solitude or a primitive and an unconfined type of recreation would be improved over the long term as heavy fuel loads are reduced, not only along established trails that also serve as fire lines, but also with regard to overland travel. Because more acres would be treated under this alternative than under Alternative 2, this benefit would be slightly greater.

Adverse Effects

- As under Alternative 2, opportunities for primitive and an unconfined type of recreation would be adversely affected in the short term as visitors are prevented from accessing portions of the wilderness during project implementation. This may include access to portions of Virgin Creek drainage not included for prescribed fire under Alternative 2.

Economics and Timing Constraints

Benefits

- Inclusion of the additional treatments in the Virgin Creek drainage would not be expected to increase the duration of treatment beyond that noted under Alternative 2.

- Inclusion of the additional treatments in the Virgin Creek drainage would further reduce the costs of future fire suppression.

Adverse effects

- The total cost of implementing this alternative would be higher than Alternative 2 because more acres would be treated. However, the cost per acre would be the same as under Alternative 2.

Safety of Visitors, Personnel, and Contractors

Benefits

- Inclusion of the additional treatments in the Virgin Creek drainage would not be expected to increase the risks associated with project implementation noted under Alternative 2.

- Inclusion of the additional treatments in the Virgin Creek drainage would enhance the safety of firefighters in managing future wildfires by reducing fuels over a larger area than Alternative 2.

Alternatives Considered but Excluded from Full Evaluation

Non-Motorized Treatment Only

Description:

Under this alternative, considered but excluded from full evaluation in the EA, the activities proposed under either Alternative 2 or Alternative 3 would be implemented using non-motorized methods only. Existing fire lines would be improved by non-motorized methods only. No new fire line would be constructed. Danger trees[43] that cannot be avoided would, wherever feasible, be blasted rather than cut to avoid the unnatural appearance of stumps. Danger trees that must be cut would be cut as close to ground level as practicable and the stumps covered with on-site native material.

Any danger trees that cannot be avoided or otherwise neutralized must be cut using crosscut saws only. Fire line improvement would likely be abandoned in those areas where it is deemed unsafe to continue work using crosscut saws only. Large amounts of untreated fuels could reduce the effectiveness of the fire lines. It is predicted, however, that most, if not all, fire line improvement could be safely accomplished using non-motorized methods only.

This alternative would allow application of prescribed fire within the Trinity Alps Wilderness by non-motorized methods only. The ability to safely ignite and manage prescribed fire in rugged, remote terrain using ground crews only is dependent on many variables (e.g., site-specific fuels conditions, weather conditions, and extent of the "burn window" – the period of time when other variables are conducive to safe and successful prescribed fire operations); unexpected changes in one or more of those variables could put ground crews at risk. Due to the existence of these variables, it is not possible to determine if ignition and management of prescribed fire on any portion of the project area by ground crews only could be safely conducted.

Due to safety and timing considerations, this alternative was not considered in detail. Because it is doubtful that prescribed fire could be safely implemented on much if any of the project area, this alternative would not accomplish the objective of reducing to an acceptable level the risks and consequences of wildfire within wilderness or escaping from wilderness or safely re-introducing fire as an ecosystem process within the Trinity Alps Wilderness within the desired project timeframe.

Comparison of Alternatives

It may be useful to compare each alternative's benefits and adverse effects to each of the criteria in tabular form, keeping in mind the law's mandate to "preserve wilderness character." See Tables D.1 through D.3 on the following pages.

[43] Danger tree - a standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree.

Table D.1. Comparison of alternatives with regard to wilderness character.

Wilderness Character	Alternative 1 No Action	Alternatives 2 Motorized and Nonmotorized methods (16,709 Acres)	Alternative 3 Motorized and Nonmotorized methods (19,088 acres)	Alternative 4 Nonmotorized methods only
Untrammelled	**Benefits:** • No direct effect **Adverse Effects:** • Future opportunities to manage lightning –caused fires as an ecosystem process would be precluded • Fire suppression would continue	**Benefits:** • Allows for less intrusive future suppression efforts • Allows for natural fire processes to be introduced back into the wilderness in the future **Adverse Effects:** • Implementing prescribed fire is an intentional, short term manipulation within the wilderness.	**Benefits:** • Allows for less intrusive future suppression efforts • Allows for natural fire processes to be introduced back into the wilderness in the future **Adverse Effects:** • Implementing prescribed fire is an intentional, short term manipulation within the wilderness. Under this alternative more acres would be manipulated, but this is a very minor additional effect.	**Benefits:** • No direct effect. **Adverse Effects:** • Adverse effects with the likelihood that future fire suppression efforts would require more intrusive tactics • Continued localized effects due to the visible evidence of previous fire suppression
Undeveloped	**Benefits:** • No Direct Effect	**Benefits:** • Would increase the ability to manage future fire using natural features rather than constructed fire lines. • Would remove evidence of past fire suppression	**Benefits:** • Would increase the ability to manage future fire using natural features rather than constructed fire lines. • Would remove evidence of past fire suppression	**Benefits:** • No Direct Effect

Wilderness Character	Alternative 1 No Action	Alternatives 2 Motorized and Nonmotorized methods (16,709 Acres)	Alternative 3 Motorized and Nonmotorized methods (19,088 acres)	Alternative 4 Nonmotorized methods only
	Adverse Effects: • No direct effect • Evidence of past fires suppression efforts would remain on the landscape • Use of more intrusive techniques using motorized equipment likely in future Restrict opportunities for use of natural rather than constructed fire management techniques	**Adverse Effects:** • Helicopters would be used for aerial ignitions • Chainsaws would be authorized for use, but only in very limited situations where emergency and safety needs cannot be met by non-motorized methods	**Adverse Effects:** • Helicopters would be used for aerial ignitions • Chainsaws would be authorized for use, but only in very limited situations where emergency and safety needs cannot be met by non-motorized methods.	**Adverse Effects:** • Continued localized effects due to the visible evidence of previous fire suppression • Perpetuation of unnatural fuel levels and uncharacteristic fire behavior and fire return intervals • Short-term, localized effects to solitude • Overland access to much of the project area would remain restricted due to heavy fuel loads and uncharacteristically dense vegetation
Natural	**Benefits:** • No Direct Effect	**Benefits:** • Beneficial long-term effects associated with re-introduction of fire as a natural ecosystem process and a trend toward more natural fire return intervals	**Benefits** • Beneficial long-term effects associated with re-introduction of fire as a natural ecosystem process and a trend toward more natural fire return intervals	**Benefits:** • No Direct Effect

Wilderness Character	Alternative 1 No Action	Alternatives 2 Motorized and Nonmotorized methods (16,709 Acres)	Alternative 3 Motorized and Nonmotorized methods (19,088 acres)	Alternative 4 Nonmotorized methods only
	Adverse Effects: • Continued localized effects due to the visible evidence of previous fire suppression • Perpetuation of unnatural fuel levels and uncharacteristic fire behavior and fire return intervals	**Adverse Effects:** • Short-term, periodic adverse effects associated with noise disturbance from helicopters and presence of work crews	**Adverse Effects:** • Short-term, periodic adverse effects associated with noise disturbance from helicopters and presence of work crews	**Adverse Effects:** • Continued localized effects due to the visible evidence of previous fire suppression • Perpetuation of unnatural fuel levels and uncharacteristic fire behavior and fire return intervals
Wilderness Character SUMMARY	• Few, if any, short-term benefits • Predicted long-term adverse effects as fuel accumulations continue to increase and in the event of future extreme wildfire behavior	• Short-term, temporary adverse effects due to noise from helicopters and smoke • Long-term benefits of reintroducing fire as an ecosystem process	• Short-term, temporary adverse effects due to noise from helicopters and smoke • Long-term benefits of reintroducing fire as an ecosystem process	• Few, if any, short-term benefits • Predicted long-term adverse effects as fuel accumulations continue to increase and in the event of future extreme wildfire behavior

Table D.2. Comparison of alternatives with regard to other criteria.

Other Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Heritage & Cultural Resources	**Benefits:** • No direct effect **Adverse Effects:** • Potential adverse effects in the event of a future wildfire	**Benefits:** • Long-term beneficial effects due to moderation of future fire behavior **Adverse Effects:** • Mitigated risk of effects from prescribed fire	**Benefits:** • Long-term beneficial effects slightly greater than Alternative 2, because more acres would be treated **Adverse Effects:** • Mitigated risk of effects from prescribed fire	**Benefits:** • No direct effect **Adverse Effects:** • Potential adverse effects in the event of a future wildfire
Maintaining Traditional Skills	**Benefits:** • No effect **Adverse Effects:** • Future fire suppression efforts would likely require more reliance on motorized and non-traditional methods	**Benefits:** • Traditional use of cross-cut saws would be maintained, except in rare instances where use of chainsaws is deemed to be safer **Adverse Effects:** • Use of helicopters to ignite prescribed fire does not promote traditional skills	**Benefits:** • Traditional use of cross-cut saws would be maintained, except in rare instances where use of chainsaws is deemed to be safer **Adverse Effects:** • Use of helicopters to ignite prescribed fire does not promote traditional skills	**Benefits:** • No effect **Adverse Effects:** • The effectiveness of this alternative is limited; future fire suppression efforts would likely require more reliance on motorized and non-traditional methods
Special Provisions	No effect	No effect	No effect	No effect

Other Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Economics & Timing	No direct costs **Benefits:** • No short-term costs associated with implementation of prescribed fire **Adverse Effects:** • Future fire suppression costs would likely be higher than under Alternative 2 or 3 • Potential future community revenue losses due to protracted area closures and/or heavy smoke during wildfires • Likelihood of protracted area closures during future wildfires	Cost to implement is approximately $25.57/acre **Benefits:** • Rate of accomplishment likelier to result in achieving objectives during a given burn window than Alternative 4 • Future fire suppression costs would likely be lower than under No Action or Alternative 4 **Adverse Effects:** • Short-term decrease in use of the area by recreationists due to smoke and/or closures, which may reduce revenues in "gateway" communities	Cost to implement is approximately $25.57/acre. **Benefits:** • Same rate of accomplishment as Alternative 2. • As with Alternative 2, future fire suppression costs would likely be lower than under No Action or Alternative 4 **Adverse Effects:** • Overall cost would be higher than Alternative 2 because more acres would be treated. • Short-term decrease in use of the area by recreationists due to smoke and/or closures, which may reduce revenues in "gateway" communities	Cost to implement is approximately $64.84/acre **Benefits:** • None **Adverse Effects:** • Slow rate of accomplishment could severely limit the ability to achieve objectives during a given burn window • Same long-term effects of future wildfires as under No Action
Additional Wilderness Specific Criteria	No effect	No effect	No effect	No effect

Other Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Other Criteria SUMMARY	• No short-term costs associated with implementation of prescribed fire • Predicted much higher suppression costs than Alternative 2 or 3 in the event of a future wildfire	• Short-term costs associated with project implementation • Lower cost per acre and higher rate of accomplishment than Alternative 4 • Predicted lower suppression costs than Alternative 1 or 4 in the event of a future wildfire	• Short-term costs associated with project implementation • Lower cost per acre and higher rate of accomplishment than Alternative 4 • Predicted lower suppression costs than Alternative 1 or 4 in the event of a future wildfire	• Short-term costs associated with project implementation • Higher cost per acre and slower accomplishment rate than Alternative 2 or 3 • Predicted much higher suppression costs than Alternative 2 or 3 in the event of a future wildfire

Table D.3. Comparison of alternatives with regard to safety

Safety	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Safety (Public and Workers)	**Benefits:** • No direct effect on safety	**Benefits:** • This alternative could be safely implemented on 16,709 acres. In addition, future fire behavior would be reduced, thus reducing risks to firefighters and the public in future wildfire events.	**Benefits:** • This alternative could be safely implemented on 19,088 acres. In addition, future fire behavior would be reduced, thus reducing risks to firefighters and the public in future wildfire events.	**Benefits:** • No risks associated with helicopter ignition of prescribed fire
	Adverse Effects: • The safety of firefighters and the public could be adversely affected with the predicted extreme behavior of future wildfires.	**Adverse Effects:** • Mitigated risks associated with ground crews performing fire line improvement, hand ignition of and management of prescribed fire • Mitigated risks associated with helicopter ignition of prescribed fire	**Adverse Effects:** • Same as Alternative 2. No increase in duration of exposure to risks is anticipated.	**Adverse Effects:** • The Forest Service determined that implementation of this alternative would present unacceptable risks to ground crews and is, therefore, infeasible. • Effects to firefighter and public safety would be essentially identical to the effects of No Action in the event of a future wildfire.

Safety Criterion

Safety is the overriding consideration for proposing the use of non-motorized and motorized methods to accomplish project objectives.

Documentation:

The risks of fire management activities have been well-documented with injury and fatality data widely available. Possible mechanisms of injury for this project are similar to those commonly faced in most wildland fire operations. The fatality data related to fire management activities through 2011 can be found in the Trinity Alps Wilderness Prescribed Fire project file. There are two primary practices generally employed to reduce the risk of injury or death while implementing the actions proposed for this project – reducing exposure to injury itself and expediting medical care should an injury occur.

The most efficient means of reducing risk through exposure for this project is aerial ignition, which would limit the placement of firefighters on the ground in proximity to active fire. The ability of ground crews to use motorized equipment (e.g., chainsaws) in site-specific situations where use of crosscut saws is determined to be unsafe would also reduce exposure to risk. The use of motorized equipment as proposed in alternatives 2 and 3 would reduce employee exposure to risk while preserving as much as possible wilderness attributes and values. This reduction of exposure would result in a significant reduction in injury potential.

In 2009, the Forest Service initiated a number of responses to mitigate risks to firefighters and to expedite medical response to those that may be injured in the line of duty. One policy outlined in a letter from the Regional Forester dated January 21, 2010 calls for an effective field medical evaluation plan to sustain life and prevent further injury; it speaks to the "time sensitive" nature of emergency medical care. In the Shasta-Trinity National Forest, this effort is further explained with direction found in a letter from the Forest Supervisor dated June 14, 2010 giving direction as to how the policy is to be implemented. Both letters may be found in the Trinity Alps Wilderness Prescribed Fire project file.

The Dutch Creek Protocol provides direction for fire management actions through the National Wildfire Coordinating Group (NWCG), of which the Forest Service is a cooperating partner. This protocol outlines a process specific to wildland fire operations to ensure firefighter safety is provided for through planning and implementation of safety measures that are standardized and are documented in Incident Action Plans (IAP). The protocol is reviewed periodically for relevance and applicability. Although Incident Management Teams (IMTs) are the primary audience, the protocol applies to all applications of wildland fire, including prescribed fire. The NWCG letter can be found in the project file.

In summary, Alternatives 2 and 3 provide the safest work environment for firefighters to implement the proposed activities and provide a future landscape where fire operations can be conducted more safely and efficiently through the reduction of exposure to employees and the increased potential for expedited emergency medical care. Alternative 1 does not expose firefighters to risk of injury or death because no action would be taken to implement the proposed activities; however, future wildfires would occur in a landscape with increased risk as has been observed during recent fires (e.g. Backbone fire). Alternative 4 (nonmotorized methods only) was not fully evaluated because it would expose firefighters to unacceptable risk; it would

be difficult if not impossible to meet the intent of Forest Service policy with regard to firefighter safety if this alternative were implemented.

Step 2 Decision: What is the Minimum Activity?

Selected alternative:

Alternative 3 – Non-Motorized and Motorized Treatments – 19,088 acres

Rationale for selecting this alternative (including safety criterion, if appropriate):

The Forest Service determined that current fuel conditions and recent fire behavior necessitate agency action; therefore, Alternative 1 (No Action) was considered unacceptable.

Alternative 2 would reduce unnatural fuel accumulations and safely re-introduce fire on 16,709 acres. This alternative would accomplish project objectives over much, but not all, of the project area.

Alternative 3 would reduce unnatural fuel accumulations and safely re-introduce fire on 19,088 acres. This alternative is preferable to Alternative 2 because the additional treatment acreage in the Virgin Creek drainage would enhance the effectiveness of treatments elsewhere in the project area and further reduce the risk of future high-severity wildfires. These additional long-term benefits would incur only minimal additional adverse effects to wilderness values – all of which would be short-term, periodic and temporary. This alternative would also trend more of the project area toward historic natural fuel accumulations, fire regimes and fire return intervals. It was determined that the additional benefits of Alternative 3 over those of Alternative 2 outweigh its additional adverse effects.

The overriding rationale for selection of Alternative 3 (nonmotorized and motorized methods) over Alternative 4 (nonmotorized methods only) is workforce safety during implementation. Alternative 4 was considered infeasible due to safety concerns – while most of the proposed fire line improvement could likely be accomplished using crosscut saws only, the safe ignition and management of prescribed fire using ground crews only would be doubtful.

Monitoring and reporting requirements:

All of the action alternatives would incorporate common mitigation and monitoring requirements:

- During pre-implementation activities the TRMU Wilderness/Trails Manager would provide certifying instruction in the use of crosscut saws and monitor all trail and fire line clearing and restoration work.
- Pre-implementation and implementation personnel would be instructed and monitored in Leave No Trace practices.
- During implementation of prescribed fire, a certified fire Wilderness Resource Advisor would monitor for the use of MIST tactics and compliance with other wilderness protection measures specified in the environmental analysis.
- A certified fire Wilderness Resource Advisor would coordinate with the designated Burn Boss concerning escaped fire.

- Supervisors of trail crews and crews performing fire line improvement would monitor to ensure proper Personal Protective Equipment (PPE) and practices specified in the project Job Hazard Analysis (JHA) are followed.
- Local residents and potential visitors would be notified of prescribed fire activities through press releases, contact with local volunteer fire organizations, and notices posted at Forest Service offices, wilderness trailheads, post offices, and other local information sites.
- Trails within the project area may be temporarily closed to ensure public safety during ignition activities.
- All motorized and mechanized use is required to be reported in the InfraWild database each year.

Check any Wilderness Act Section 4(c) uses approved in this alternative:

☒ **mechanical transport** ☐ **landing of aircraft**

☒ **motorized equipment** ☐ **temporary road**

☐ **motor vehicles** ☐ **structure or installation**

☐ **motorboats**

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency procedures.

Approvals	Signature	Name	Position	Date
Prepared by:		/s/ Anna E. Hammet	Vegetative Management Solutions - Biological Scientist	3/22/13
Recommended:		/s/ Christina J. Boston	Wilderness and Wild and Scenic Rivers Program Leader	4/18/13
Recommended:		PRIOR COUNCILS	FOREST FIRE MANAGEMENT OFFICER	5-3-13
Recommended:				
Recommended:				
Approved:			Shasta-Trinity Forest Supervisor	

Approvals	Signature	Name	Position	Date
Prepared by:		Anna E. Hammet	Vegetation Management Solutions - Biological Scientist	3/22/13
Recommended:	/s/	/s/ Christina J. Boston	Regional Wilderness and Wild and Scenic Rivers Program Leader	4/18/13
Recommended:		Tina Lynsky	Trinity River Management Unit District Ranger	5/6/13
Recommended:		Brenda Tracy	Forest Public Services Staff Officer Shasta-Trinity National Forest	5/16/13
Approved:		for J. Sharon Heywood	Shasta-Trinity Forest Supervisor	6/17/13

APPENDIX E – MINIMUM IMPACT SUPPRESSION TACTICS (MIST) GUIDELINES

NWCG Guidance on Minimum Impact Suppression Tactics
In Response To the

10-YEAR IMPLEMENTATION PLAN FOR REDUCING WILDLAND FIRE RISKS TO COMMUNITIES AND THE ENVIRONMENT

TASK: Prepare awareness and training information on the use of minimum impact suppression activities and deliver through standard firefighting training program.

MINIMUM IMPACT SUPPRESSION TACTICS (MIST) ACTION ITEMS

ACTION ITEMS 1 & 2: *Critically review MIST policies, determine need to increase awareness of MIST, and recommend changes to policies and guidelines.*

POLICY
The change from **fire control** to **fire management** has added a new perspective to the role of fire manager and the firefighter. Traditional thinking that "the only safe fire is a fire without a trace of smoke" is no longer valid. Fire Management now means managing fire "with time" as opposed to "against time." The objective of putting the fire dead out by a certain time has been replaced by the need to make unique decisions with each fire start to consider the land, resource and incident objectives, and to decide the appropriate management response and tactics which result in minimum costs and minimum resource damage.

This change in thinking and way of doing business involves not just firefighters. It involves all levels of management. Fire management requires the fire manager and firefighter to select management tactics commensurate with the fire's potential or existing behavior while producing the least possible impact on the resource being protected. The term used to describe these tactics is "Minimum Impact Suppression Tactics", commonly called MIST. Simply put: MIST is a 'do least damage' philosophy. MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mindset - how to suppress a wildfire while minimizing the long-term effects of the suppression action. MIST is the concept of using the minimum tool to safely and effectively accomplish the task. MIST should be considered for application on all fires in all types of land management.

While MIST emphasizes suppressing wildland fire with the least impact to the land, actual fire conditions and good judgment will dictate the actions taken. Consider what is necessary to halt fire spread and containment within the fire line or designated perimeter boundary, while safely managing the incident.

Use of MIST **will not** compromise firefighter safety or the effectiveness of suppression efforts. Safety zones and escape routes will be a factor in determining fire line location.

Accomplishments of minimum impact fire management techniques originate with instructions that are understandable, stated in measurable terms, and communicated both verbally and in writing. They are ensured by monitoring results on the ground. Evaluation of these tactics both during and after implementation will further the understanding and achievement of good land stewardship ethics during fire management activities.

GUIDELINES

The intent of this guide is to serve as a checklist for all fire management personnel. Be creative and seek new ways to implement MIST.

INCIDENT MANAGEMENT CONSIDERATIONS

Fire managers and firefighters select tactics that have minimal impact to values at risk. These values are identified in approved Land or Resource Management Plans. Standards and guidelines are then tied to implementation practices which result from approved Fire Management Plans.

 Firefighter and public safety cannot be compromised.

 Evaluate suppression tactics during planning and strategy sessions to ensure they meet agency administrator objectives and MIST. Include agency Resource Advisor and/or designated representative.

 Communicate MIST where applicable during briefings and implement during all phases of operations.

 Evaluate the feasibility of Wildland Fire Use in conjunction with MIST when appropriate for achieving resource benefits.

RESPONSIBILITIES

Agency Administrator or Designee

 Ensure agency personnel are provided with appropriate MIST training and informational/educational materials at all levels.

 Communicate land and fire management objectives to Incident Commander.

 Periodically monitor incident to ensure resource objectives are met.

 Participate in incident debriefing and assist in evaluation of performance related to MIST.

Incident Commander

 Communicate land and fire management objectives to general staff.

 Evaluate suppression tactics during planning and strategy sessions to see that they meet the Agency Administrator's objectives and MIST guidelines.

 Monitor operations to ensure MIST is implemented during line construction as well as other resource disturbing activities.

 Include agency Resource Advisor and/or local representative during planning, strategy, and debriefing sessions.

Resource Advisor

 Ensure interpretation and implementation of WFSA/WFIP and other oral or written line officer direction is adequately carried out.

 Participate in planning/strategy sessions and attend daily briefings to communicate resource concerns and management expectations.

 Review Incident Action Plans (IAP) and provide specific direction and guidelines as needed.
 Monitor on the ground applications of MIST.
 Provide assistance in updating WFSA/WFIP when necessary.
 Participate in debriefing and assist in evaluation of performance related to MIST.

Planning Section
 Use Resource Advisor to help assess that management tactics are commensurate with land/resource and incident objectives.
 Ensure that instructions and specifications for MIST are communicated clearly in the IAP.
 Anticipate fire behavior and ensure all instructions can be implemented safely.

Logistics Section
 Ensure actions performed around Incident Command Post (ICP), staging areas, camps, helibases, and helispots result in minimum impact on the environment.

Operations Section
 Evaluate MIST objectives to incorporate into daily operations and IAP.
 Monitor effectiveness of suppression tactics in minimizing impacts to resources and recommend necessary changes during planning/strategy sessions.
 Communicate MIST to Division Supervisors and Air Ops/Support during each operational period briefing. Explain expectations for instructions listed in Incident Action Plan.
 Participate in incident debriefing and assist in evaluation of performance related to MIST.

Division/Group Supervisor and Strike Team/Task Force Leader
 Communicate MIST objectives and tactics to single resource bosses.
 Recommend specific tasks on divisions to implement MIST.
 Monitor effectiveness of suppression tactics in minimizing impacts to resources and recommend necessary changes to Operations Section Chief.

Single Resource Bosses
 Communicate MIST objectives to crew members.
 Monitor work to ensure that crews are adhering to MIST guidelines and specific incident objectives.
 Provide feedback to supervisor on implementation of MIST.

IMPLEMENTATION
Keep this question in mind: What creates the greater impact, the fire suppression effort or the fire?
Safety
 Apply principles of LCES to all planned actions.
 Constantly review and apply the 18 Watch Out Situations and 10 Standard Fire Orders.
 Be particularly cautious with:
  - Burning snags allowed to burn.
  - Burning or partially burned live and dead trees.
  - Unburned fuel between you and the fire.

Escape Routes and Safety Zones

 In any situation, the best escape routes and safety zones are those that already exist. Identifying natural openings, existing roads and trails and taking advantage of safe black will always be a preferred tactic compatible with MIST. If safety zones must be created, follow guidelines similar to those for helispot construction.

 Constructed escape routes and safety zones in heavier fuels will have a greater impact, be more time consuming, labor intensive and ultimately less safe.

General Considerations

 Consider the potential for introduction of noxious weeds and mitigate by removing weed seed from vehicles, personal gear, cargo nets, etc.

 Consider impacts to riparian areas when siting water handling operations.

- Use longer draft hoses to place pumps out of sensitive riparian areas.
- Plan travel routes for filling bladder bags to avoid sensitive riparian areas.

 Ensure adequate spill containment at fuel transfer sites and pump locations. Stage spill containment kits at the incident.

Fire Lining Phase

 Select tactics, tools, and equipment that least impact the environment.

 Give serious consideration to use of water or foam as a fire lining tactic.

 Use alternative mechanized equipment such as excavators and rubber tired skidders rather than bulldozers when constructing mechanical line.

 Allow fire to burn to natural barriers and existing roads and trails.

 Monitor and patrol fire lines to ensure continued effectiveness.

Ground Fuels

 Use cold-trail, wet line or combination when appropriate. If constructed fire line is necessary, use minimum width and depth to stop fire spread.

 Consider the use of fire line explosives (FLE) for line construction and snag falling to create more natural appearing fire lines and stumps.

 Burn out and use low impact tools like swatters and gunny sacks.

 Minimize bucking to establish fire line: preferably move or roll downed material out of the intended constructed fire line area. If moving or rolling out is not possible, or the downed log/bole is already on fire, build line around it and let the material be consumed.

Aerial fuels–brush, trees, and snags:

 Adjacent to fire line: limb only enough to prevent additional fire spread.

 Inside fire line: remove or limb only those fuels which would have potential to spread fire outside the fire line.

 Cut brush or small trees necessary for fire line construction flush to the ground.

 Trees, burned trees, and snags:

- Minimize cutting of trees, burned trees, and snags.
- Do not cut live trees unless it is determined they will cause fire spread across the fire line or seriously endanger workers. Cut stumps flush with the ground.
- Scrape around tree bases near fire line if hot and likely to cause fire spread.
- Identify hazard trees with flagging, glowsticks, or a lookout.

 When using indirect attack:

- Do not fall snags on the intended unburned side of the constructed fire line unless they are an obvious safety hazard to crews.
- Fall only those snags on the intended burn-out side of the line that would reach the fire line should they burn and fall over.

Mopup Phase

 Consider using "hot-spot" detection devices along perimeter (aerial or hand-held).

 Use extensive cold-trailing to detect hot areas.

 Cold-trail charred logs near fire line: do minimal scraping or tool scarring. Restrict spading to hot areas near fire line.

 Minimize bucking of logs to check for hot spots or extinguish fire: preferably roll the logs and extinguish the fire.

 When ground is cool return logs to original position after checking.

 Refrain from piling: burned/partially burned fuels that were moved should be arranged in natural positions as much as possible.

 Consider allowing larger logs near the fire line to burn out instead of bucking into manageable lengths. Use a lever, etc. to move large logs.

 Use gravity socks in stream sources and/or combination of water blivets and fold-a-tanks to minimize impacts to streams.

 Personnel should avoid using rehabilitated fire lines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work.

 Avoid use of non-native materials for sediment traps in streams.

 Aerial fuels (brush, small trees, and limbs): remove or limb only those fuels which if ignited have potential to spread fire outside the fire line.

 Burning trees and snags:

- *Be particularly cautious when working near snags (*ensure adequate safety measures are communicated).
- The first consideration is to allow a burning tree/snag to burn itself out or down.
- Identify hazard trees with flagging, glow-sticks or a lookout.
- If there is a serious threat of spreading firebrands, extinguish with water or dirt.
- Consider felling by blasting, if available.

Aviation Management

Minimize the impacts of air operations by incorporating MIST in conjunction with the standard aviation risk assessment process.

 Possible aviation related impacts include:

- Damage to soils and vegetation resulting from heavy vehicle traffic, noxious weed transport, and/or extensive modification of landing sites.
- Impacts to soil, fish and wildlife habitat, and water quality from hazardous material spills.
- Chemical contamination from use of retardant and foam agents.
- Biological contamination to water sources, e.g., whirling disease.
- Safety and noise issues associated with operations in proximity to populated areas, livestock interests, urban interface, and incident camps and staging areas.

 Helispot Planning

- When planning for helispots determine the primary function of each helispot, e.g., crew transport or logistical support.
- Consider using long-line remote hook in lieu of constructing a helispot.
- Consult Resource Advisors in the selection and construction of helispots during incident planning.
- Estimate the amount and type of use a helispot will receive and adapt features as needed.

 Balance aircraft size and efficiency against the impacts of helispot construction.

 Use natural openings as much as possible. If tree felling is necessary, avoid high visitor use locations unless the modifications can be rehabilitated. Fall, buck, and limb only what is necessary to achieve a safe and practical operating space.

Retardant, Foam, and Water Bucket Use

 Assess risks to sensitive watersheds from chemical retardants and foam. Communicate specific drop zones to air attack and pilots, including areas to be avoided.

 Fire managers should weigh use of retardant with the probability of success by unsupported ground force. Retardant may be considered for sensitive areas when benefits will exceed the overall impact. This decision must take into account values at risk and consequences of expanded fire response and impact on the land.

 Consider biological and/or chemical contamination impacts when transporting water.

 Limited water sources expended during aerial suppression efforts should be replaced. Consult Resource Advisors prior to extended water use beyond initial attack.

Logistics, Camp Sites, and Personal Conduct

 Consider impacts on present and future visitors.

 Provide portable toilets at areas where crews are staged.

 Good campsites are found, not made. If existing campsites are not available, select campsites not likely to be observed by visitors

 Select impact-resistant sites such as rocky or sandy soil, or openings within heavy timber. Avoid camping in meadows and along streams or shores.

 When there is a small group try to disperse use. In the case of larger camps: concentrate, mitigate, and rehabilitate.

 Lay out camp components carefully from the start. Define cooking, sleeping, latrine, and water supplies.

 Prepare bedding and campfire sites with minimal disturbance to vegetation and ground.

 Personal Sanitation:

- Designate a common area for personnel to wash up. Provide fresh water and biodegradable soap.
- Do not introduce soap, shampoo or other chemicals into waterways.
- Dispose of wastewater at least 200 feet from water sources.
- Toilet sites should be located a minimum of 200 feet from water sources. Holes should be dug 6-8 inches deep.
- If more than 1 crew is camped at a site strongly consider portable toilets and remove waste.

 Store food so that it is not accessible to wildlife, away from camp and in animal resistant containers.

 Do not let garbage and food scraps accumulate in camp.

 Monitor travel routes for damage and mitigate by:

- Dispersing on alternate routes or
- Concentrating travel on one route and rehabilitate at end of use.

 If a campfire is built, leave no trace of it and avoid using rock rings. Use dead and down wood for the fire and scatter any unused firewood. Do not burn plastics or metal.

Restoration and Rehabilitation

 Fire lines:

- After fire spread has stopped and lines are secured, fill in deep and wide fire lines and cup trenches and obliterate any berms.
- Use waterbars to prevent erosion, or use woody material to act as sediment dams.

Maximum Waterbar Spacing	
Percent Grade	Maximum Spacing, Feet
< 9	400
10 – 15	200
15 – 25	100
25 +	50

- Ensure stumps are cut flush with ground.
- Camouflage cut stumps by flush-cutting, chopping, covering, or using FLE to create more natural appearing stumps.
- Any trees or large size brush cut during fire line construction should be scattered to appear natural.
- Discourage the use of newly created fire lines and trails by blocking with brush, limbs, poles, and logs in a naturally appearing arrangement.

 Camps:

- Restore campsite to natural conditions.
- Scatter fireplace rocks and charcoal from fire, cover fire ring with soil, and blend area with natural cover.
- Pack out all garbage.

 General:

- Remove all signs of human activity.
- Restore helicopter landing sites.
- Fill in and cover latrine sites.

 Walk through adjacent undisturbed areas and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible.

APPENDIX F – MAPS

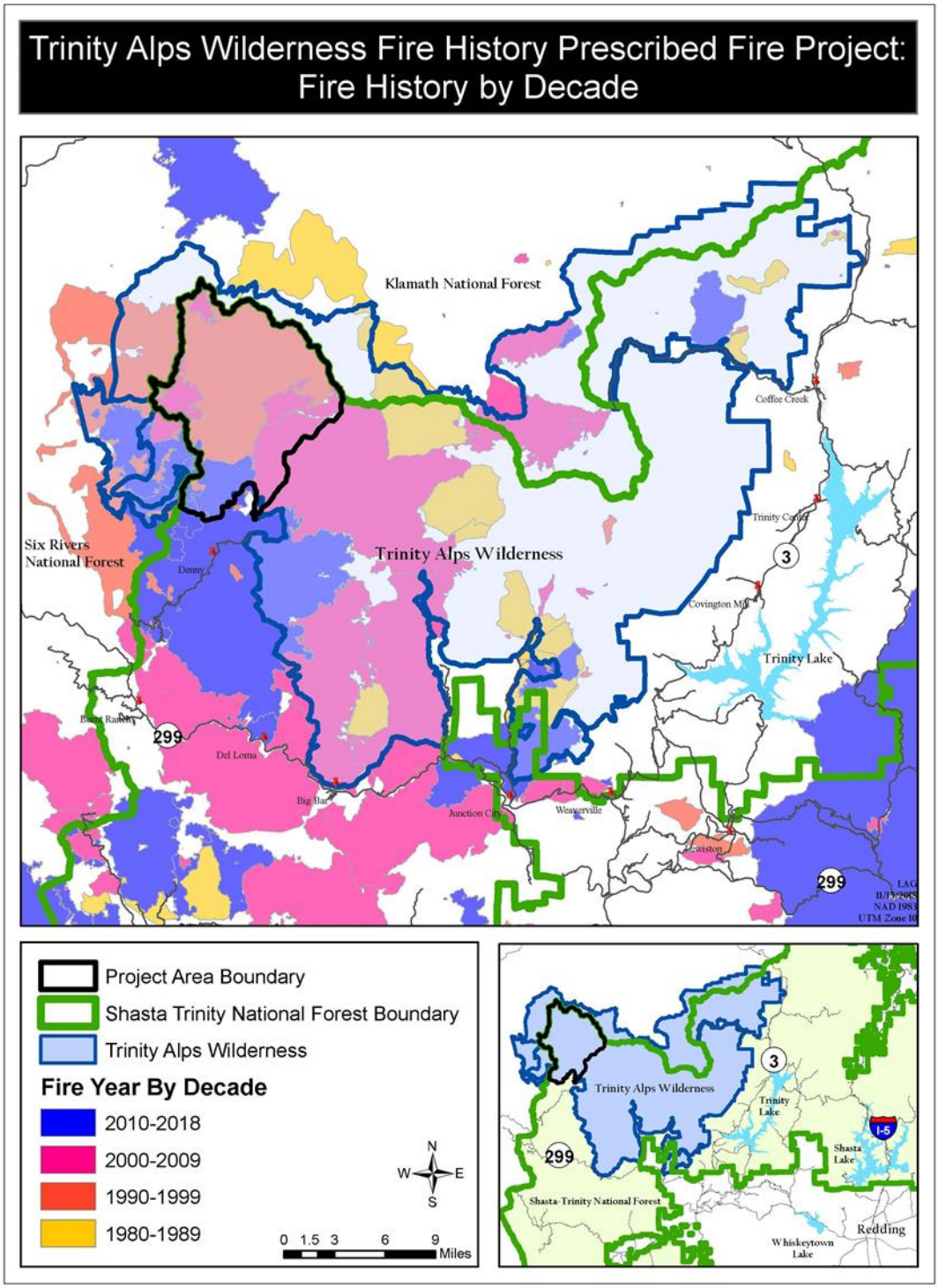


Figure F.1. Large fire history in the Trinity Alps Wilderness, by decade.

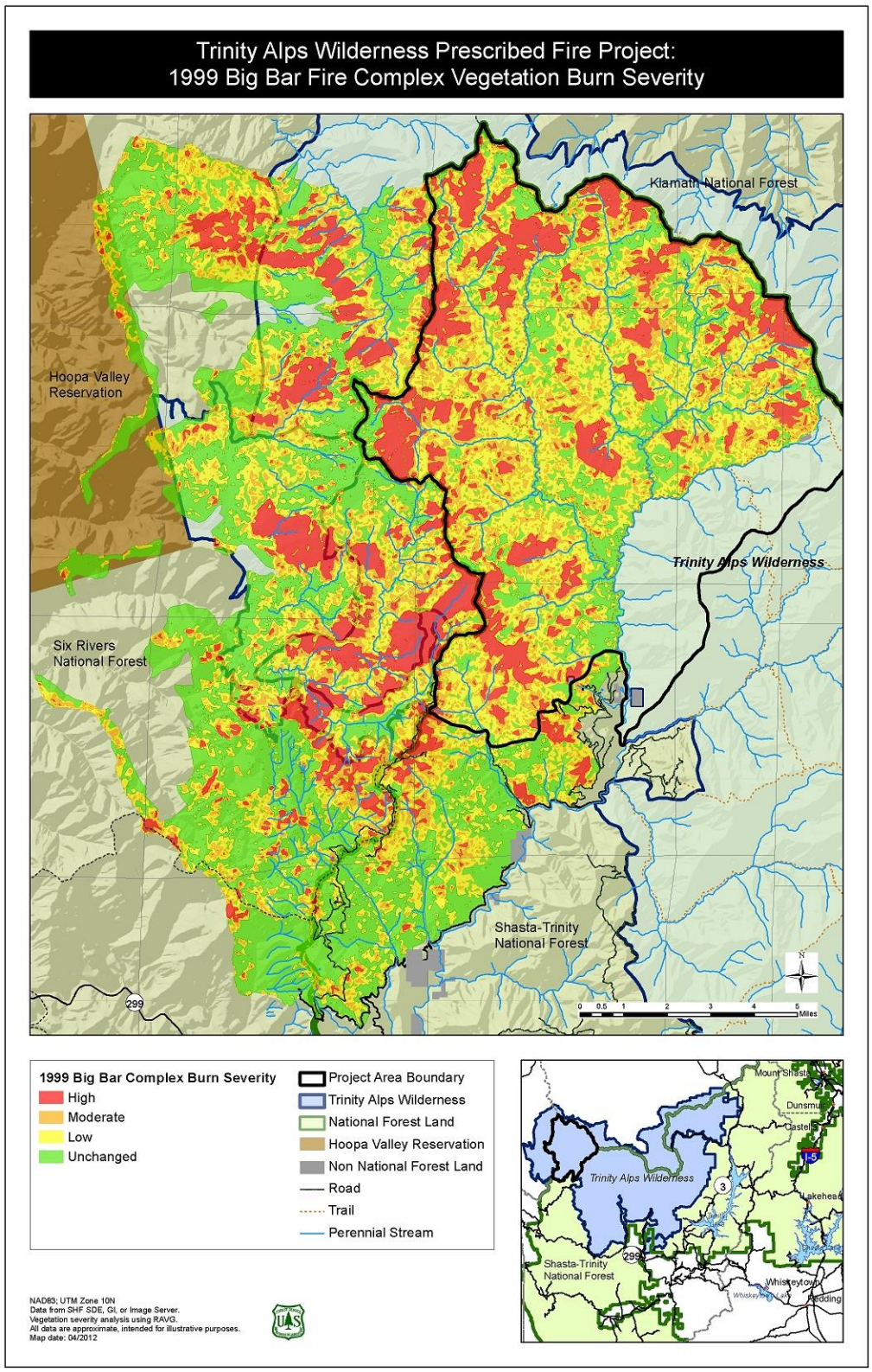


Figure F.2. Vegetation fire severities during the 1999 Big Bar Complex, Trinity Alps Wilderness.

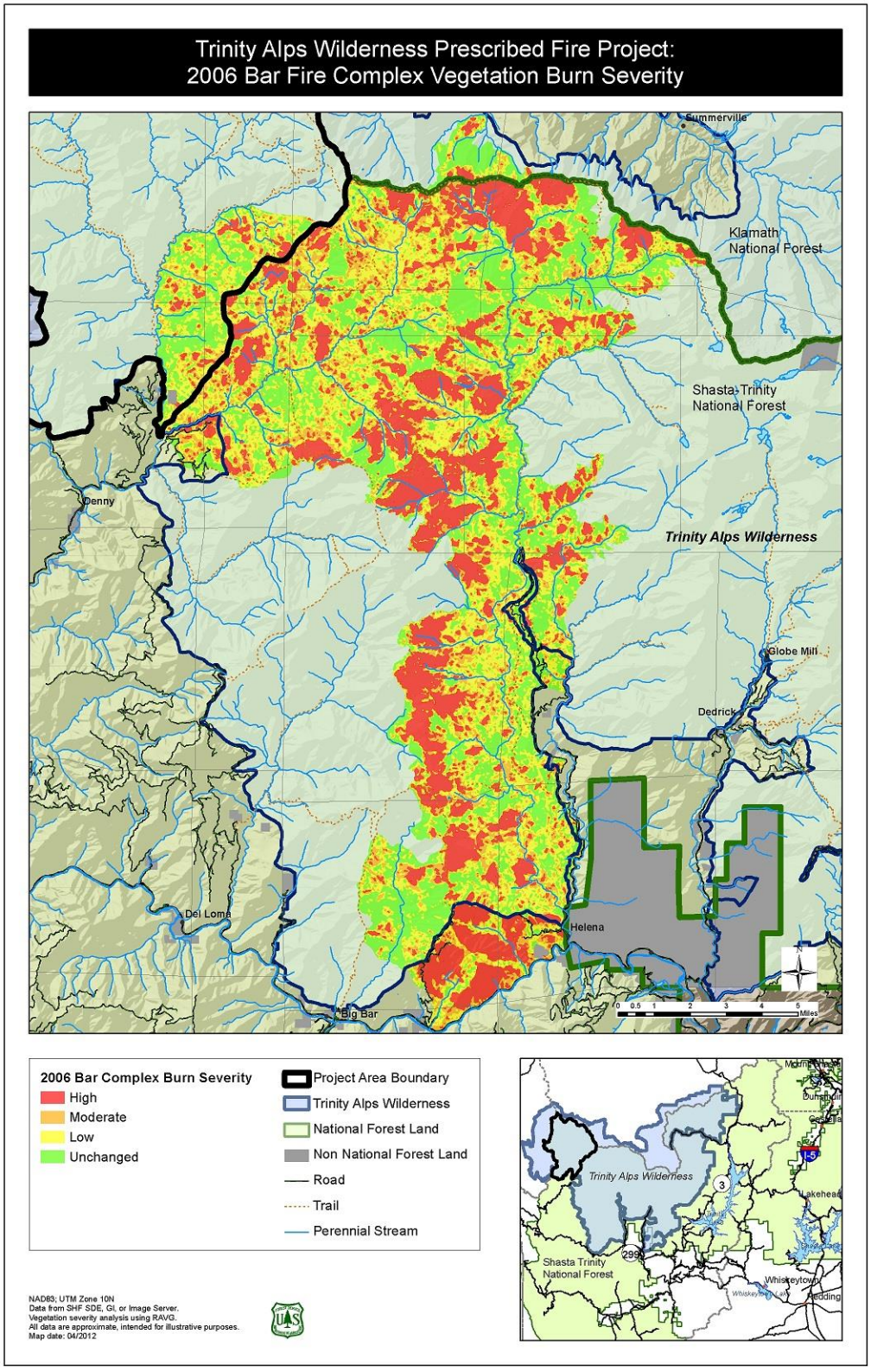


Figure F.3. Vegetation fire severities during the 2006 Bar Complex, Trinity Alps Wilderness.

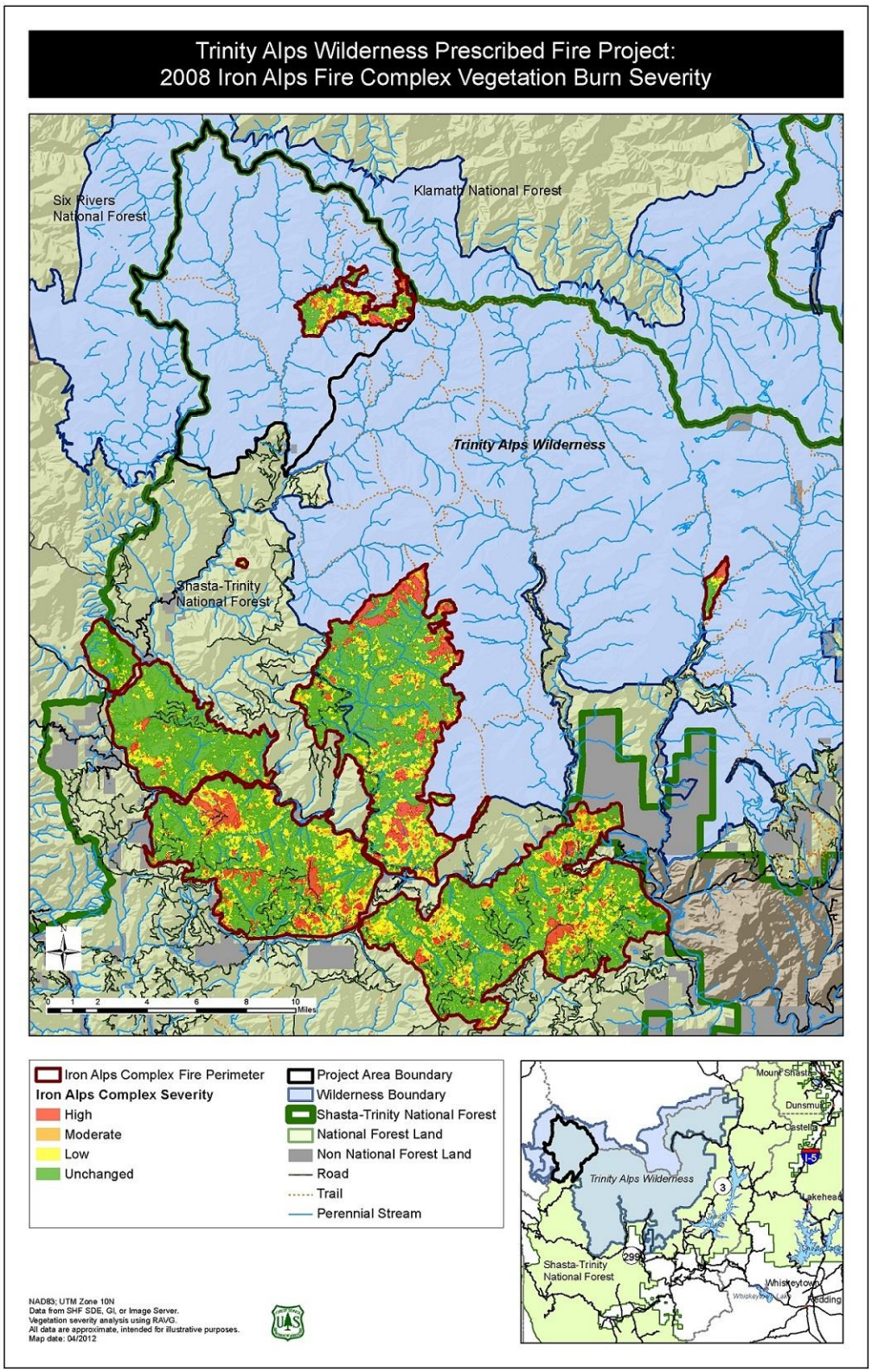


Figure F.4. Vegetation fire severities during the 2008 Iron/Alps Complex, Trinity Alps Wilderness.

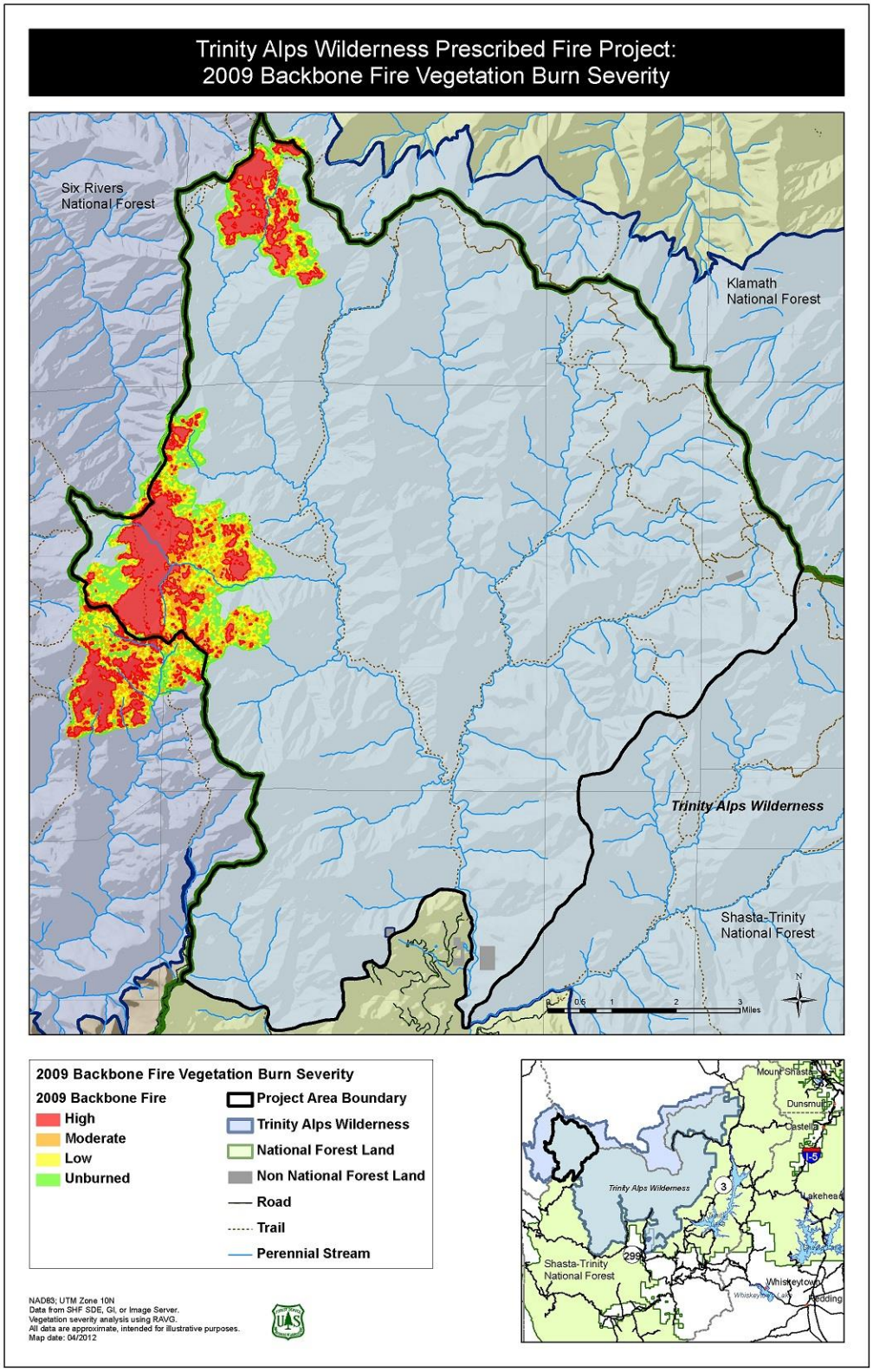


Figure F.5. Vegetation fire severities during the 2009 Backbone Fire, Trinity Alps Wilderness.

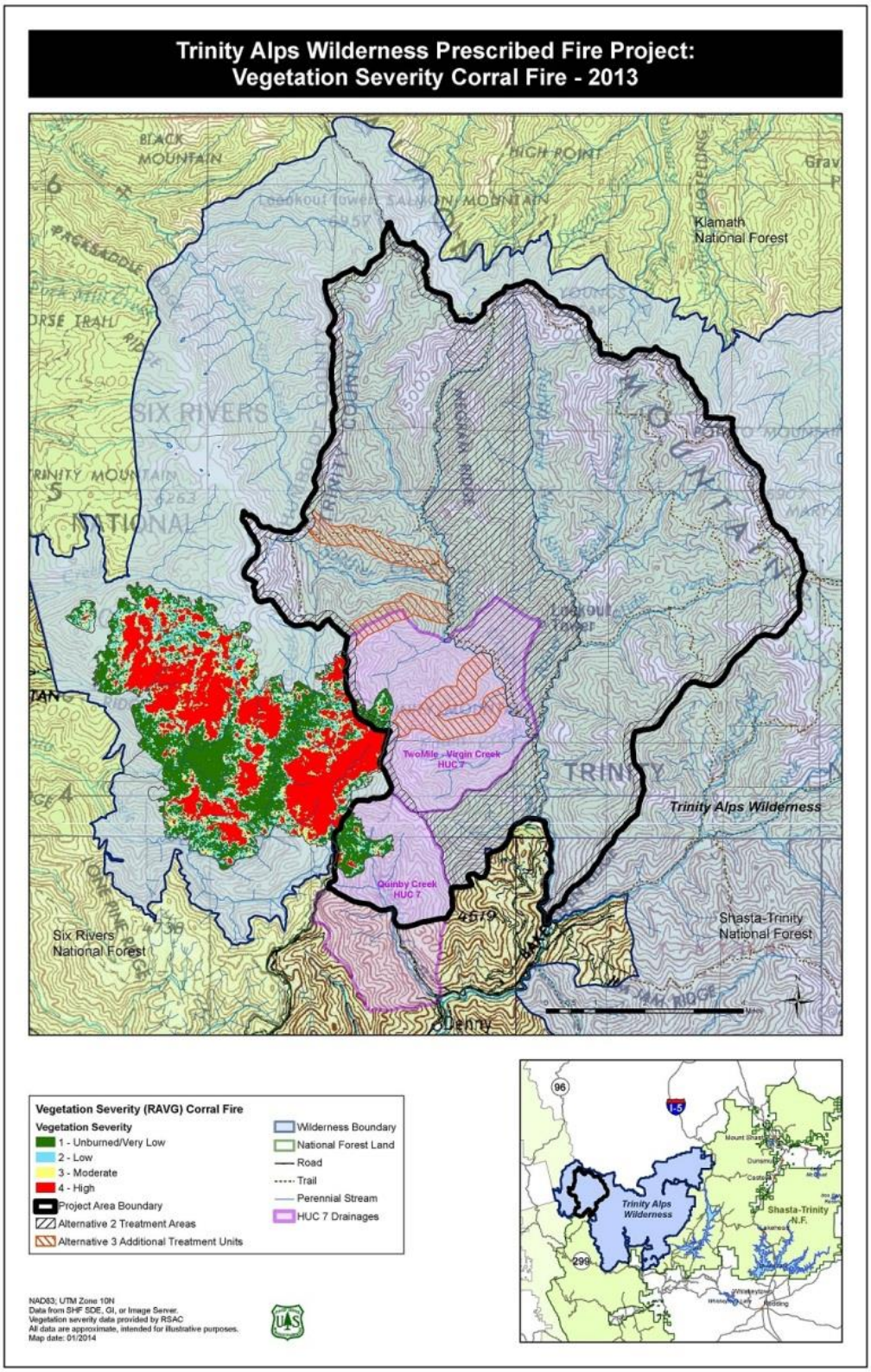


Figure F.6. Vegetation fire severities during the 2013 Corral Complex Fire, Trinity Alps Wilderness.

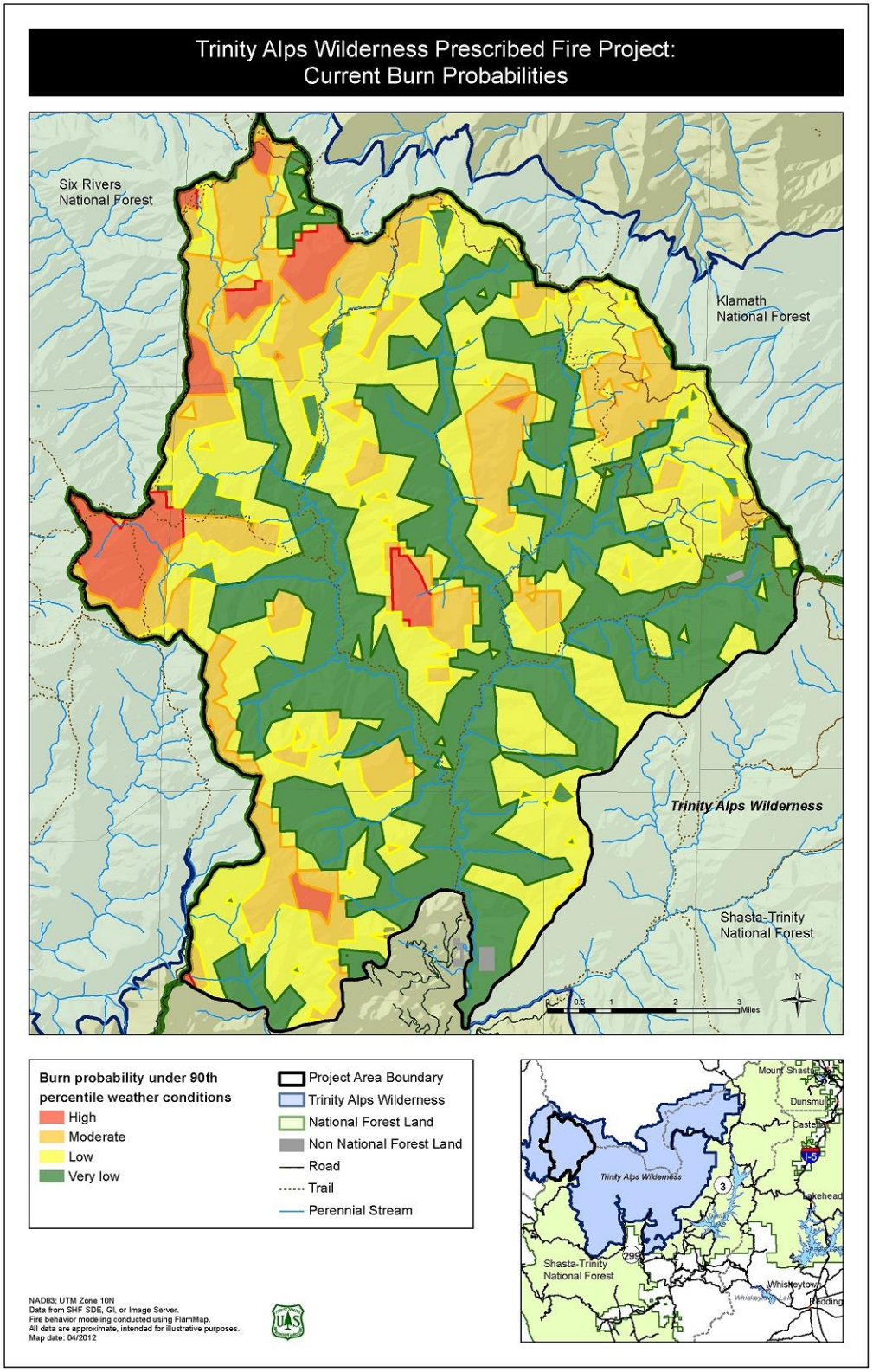


Figure F.7. Current burn probabilities under 90th percentile conditions in the project area.

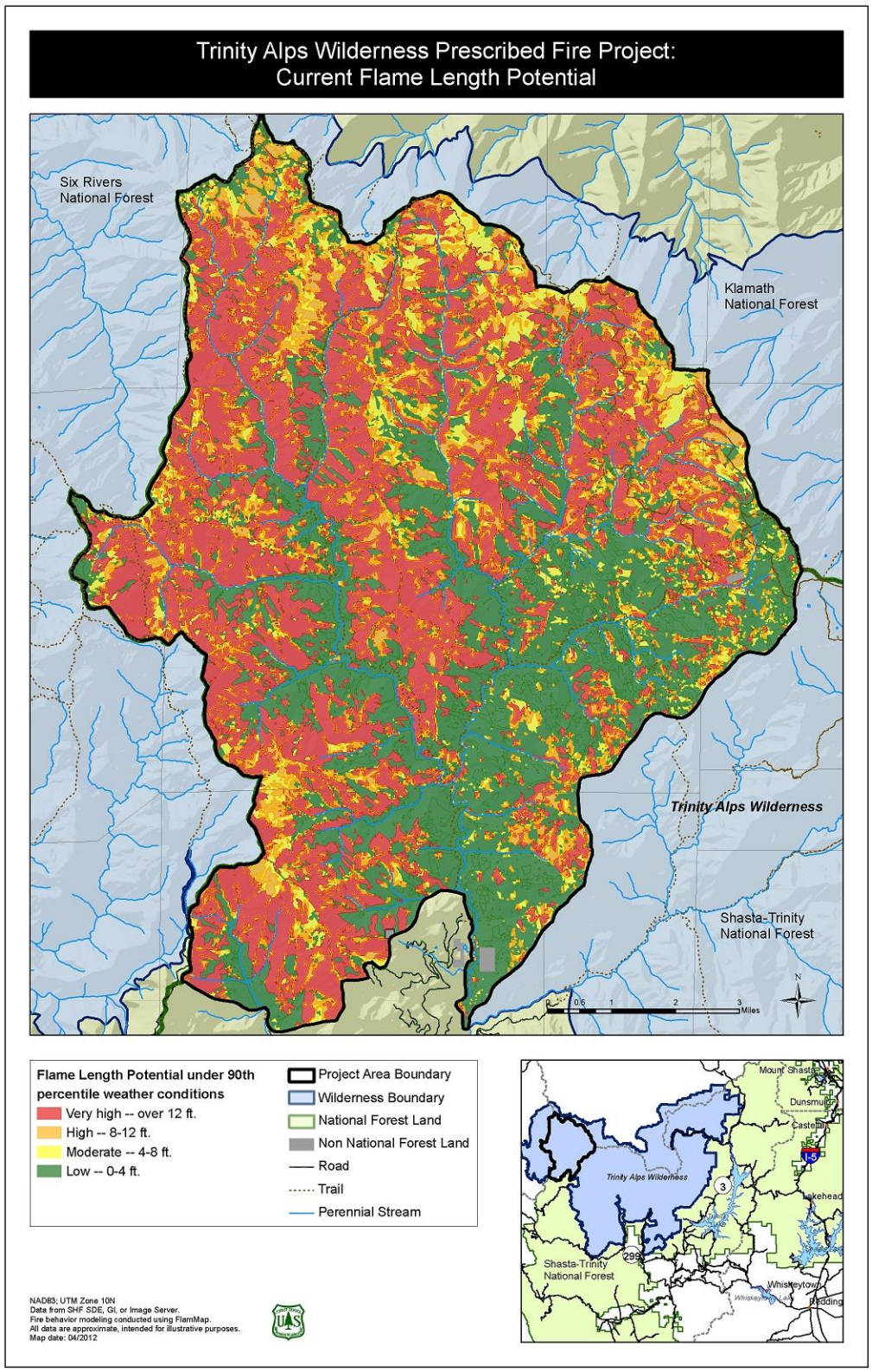


Figure F.8. Current flame length potential under 90th percentile conditions in the project area.

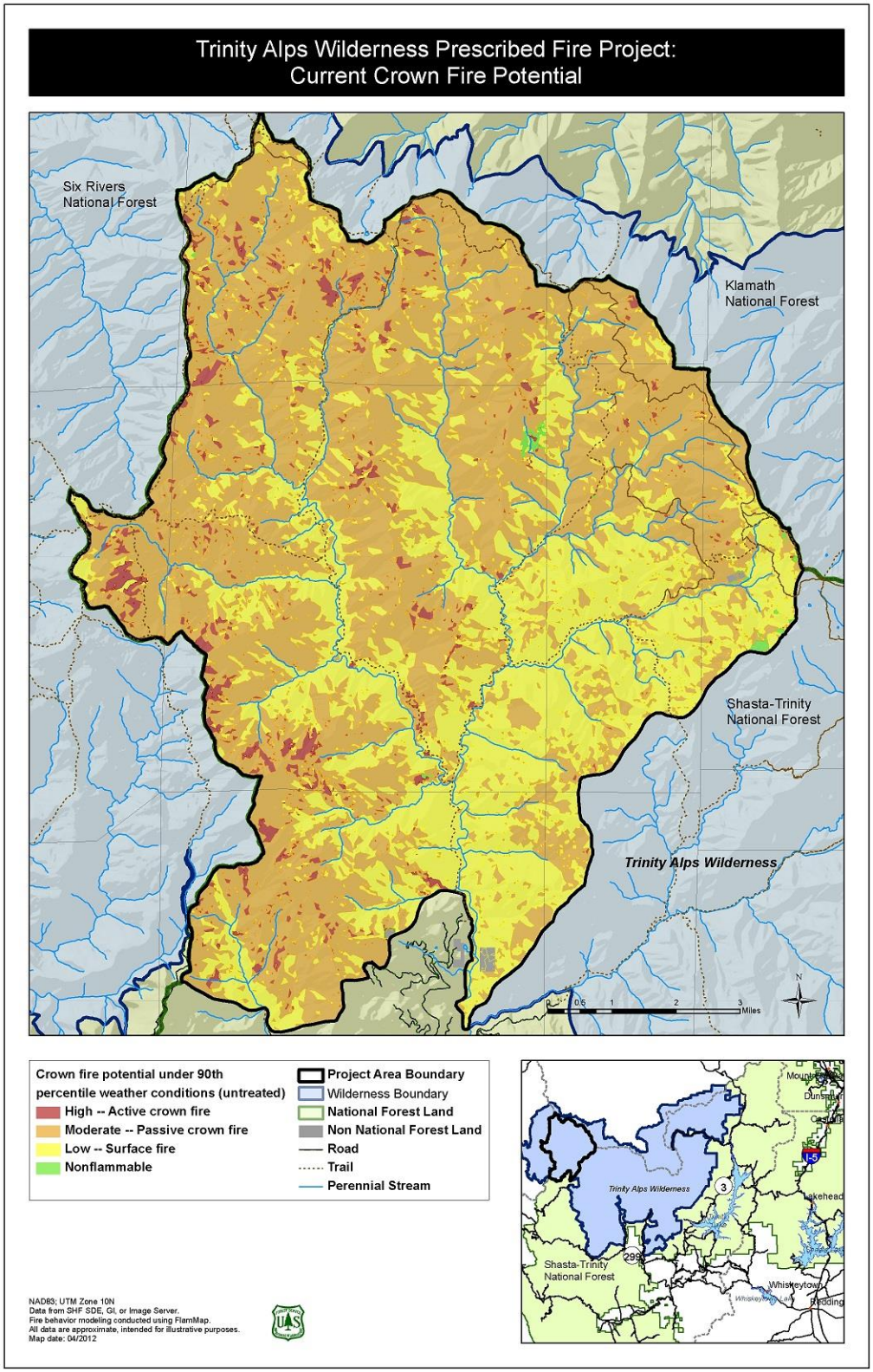


Figure F.9. Current crown fire potential under 90th percentile conditions in the project area.

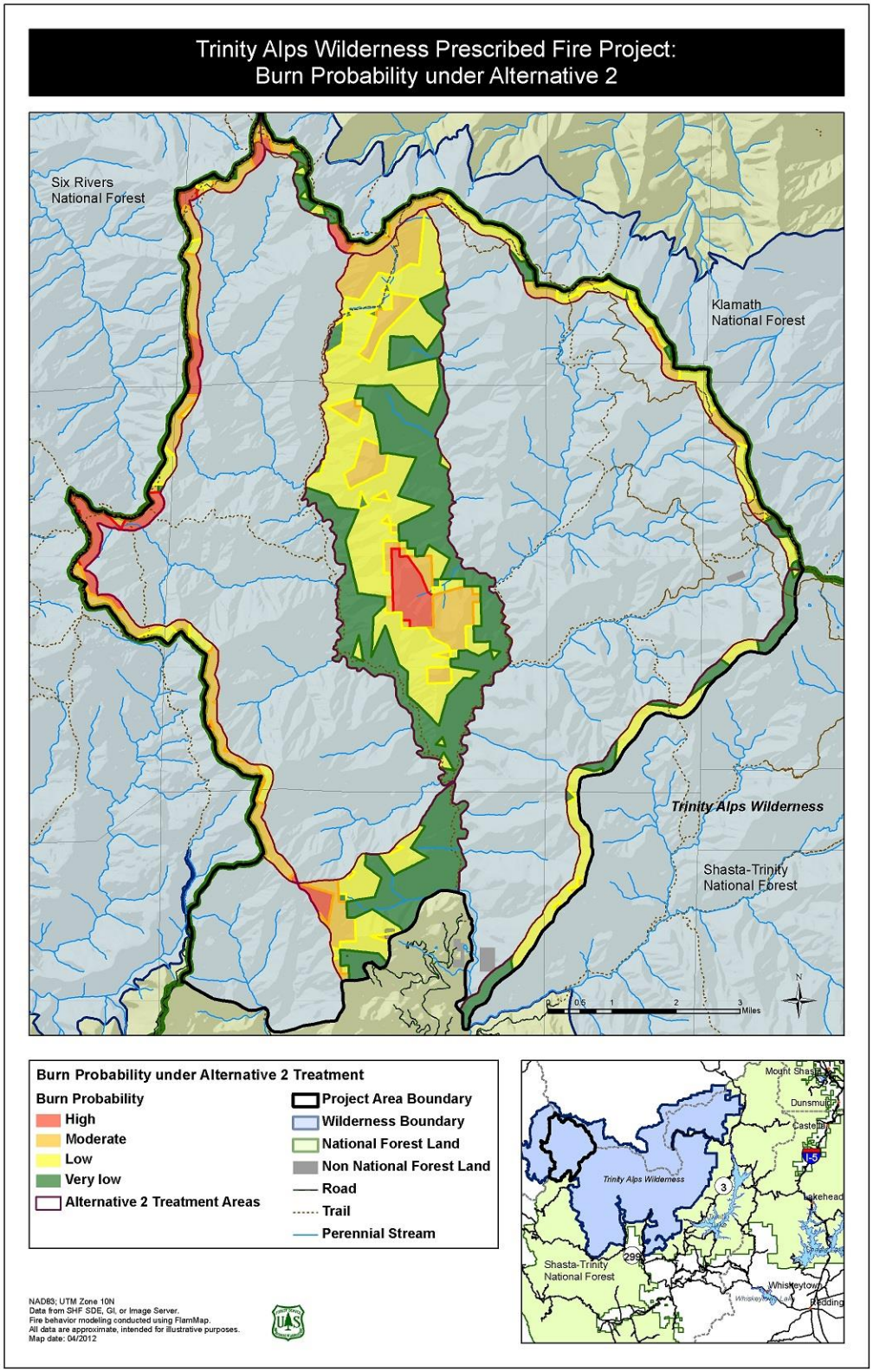


Figure F.10. Burn probabilities under Alternative 2.

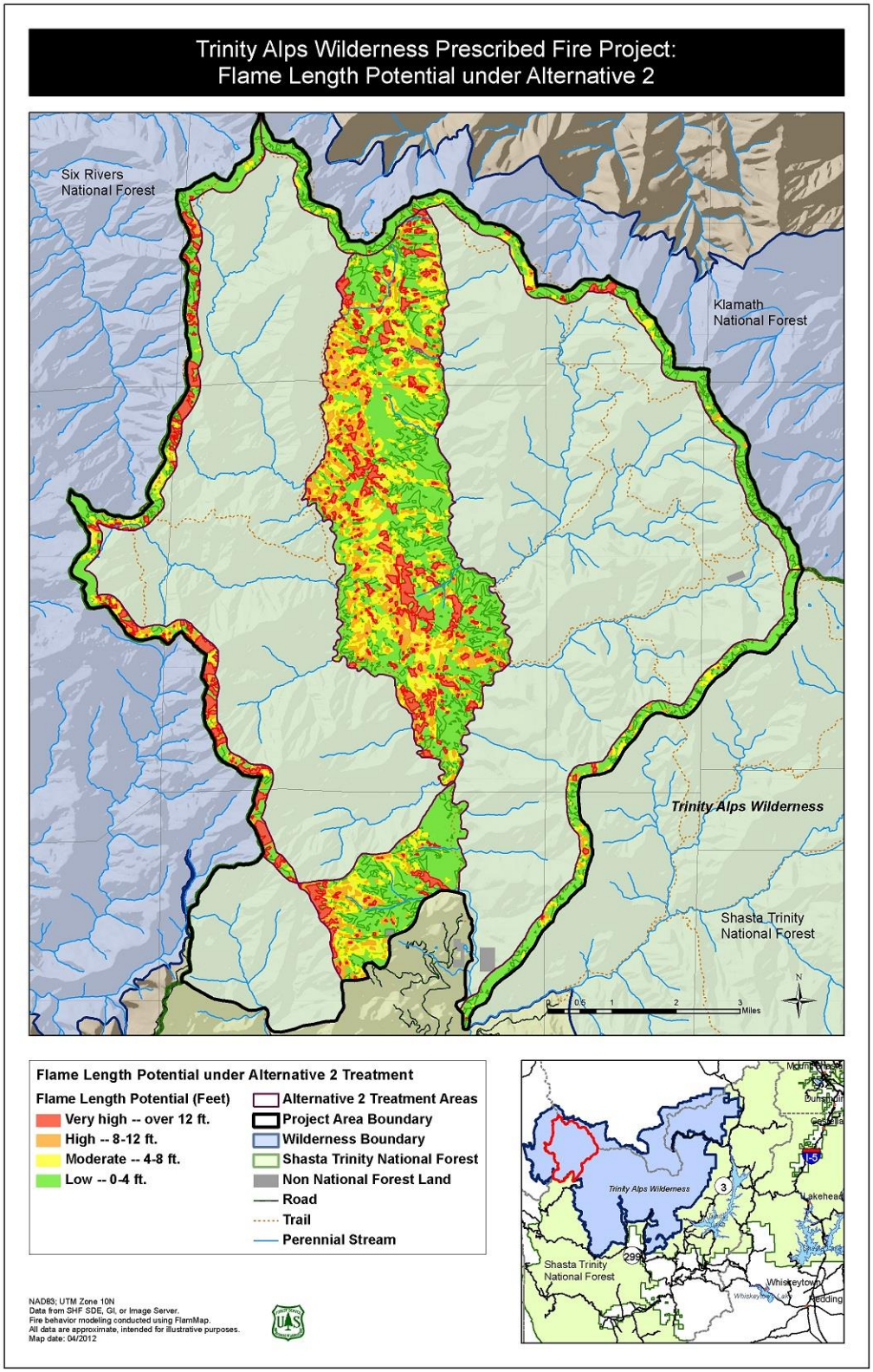


Figure F.11. Flame length potential under Alternative 2.

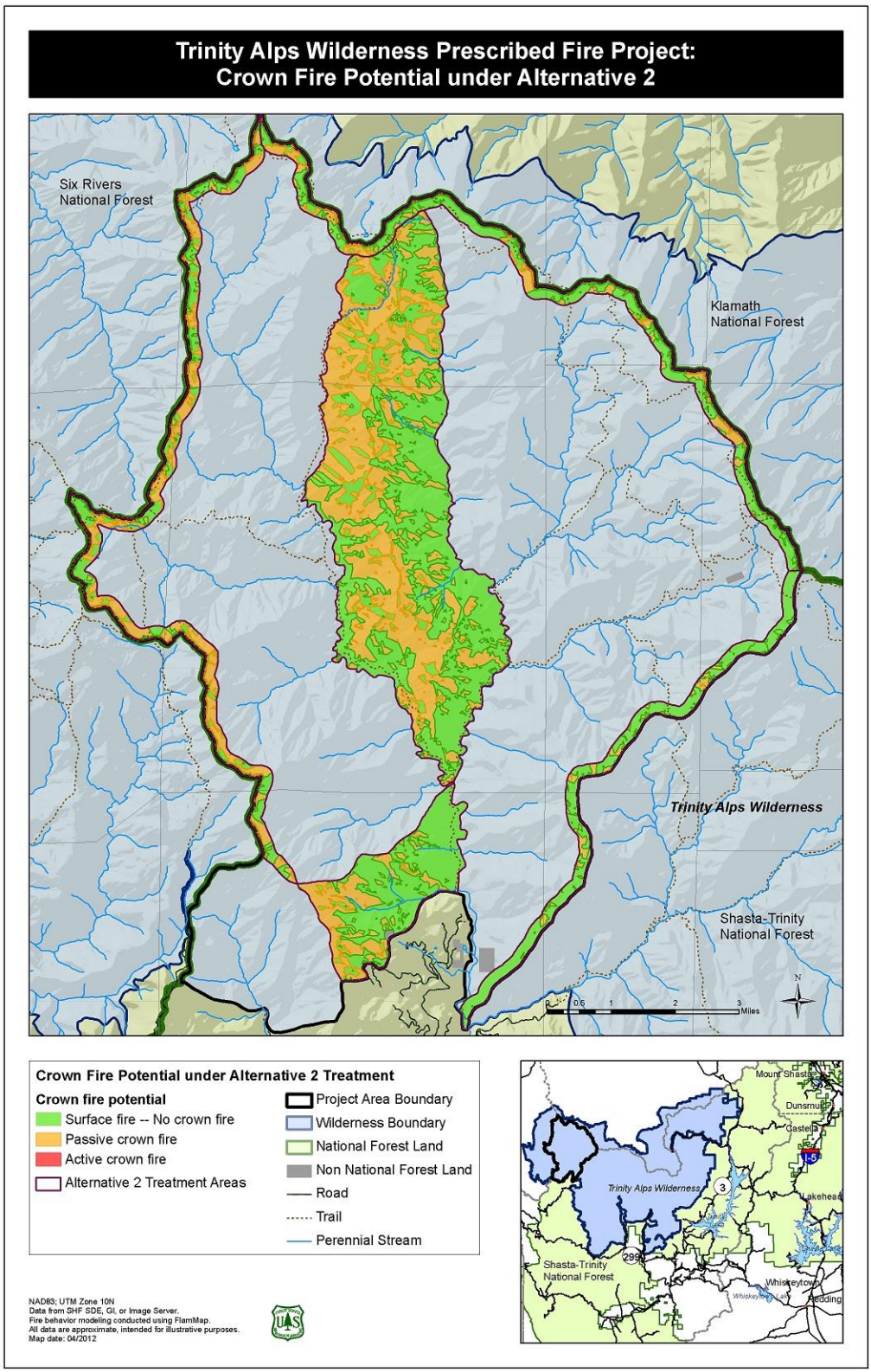


Figure F.12. Crown fire potential under Alternative 2.

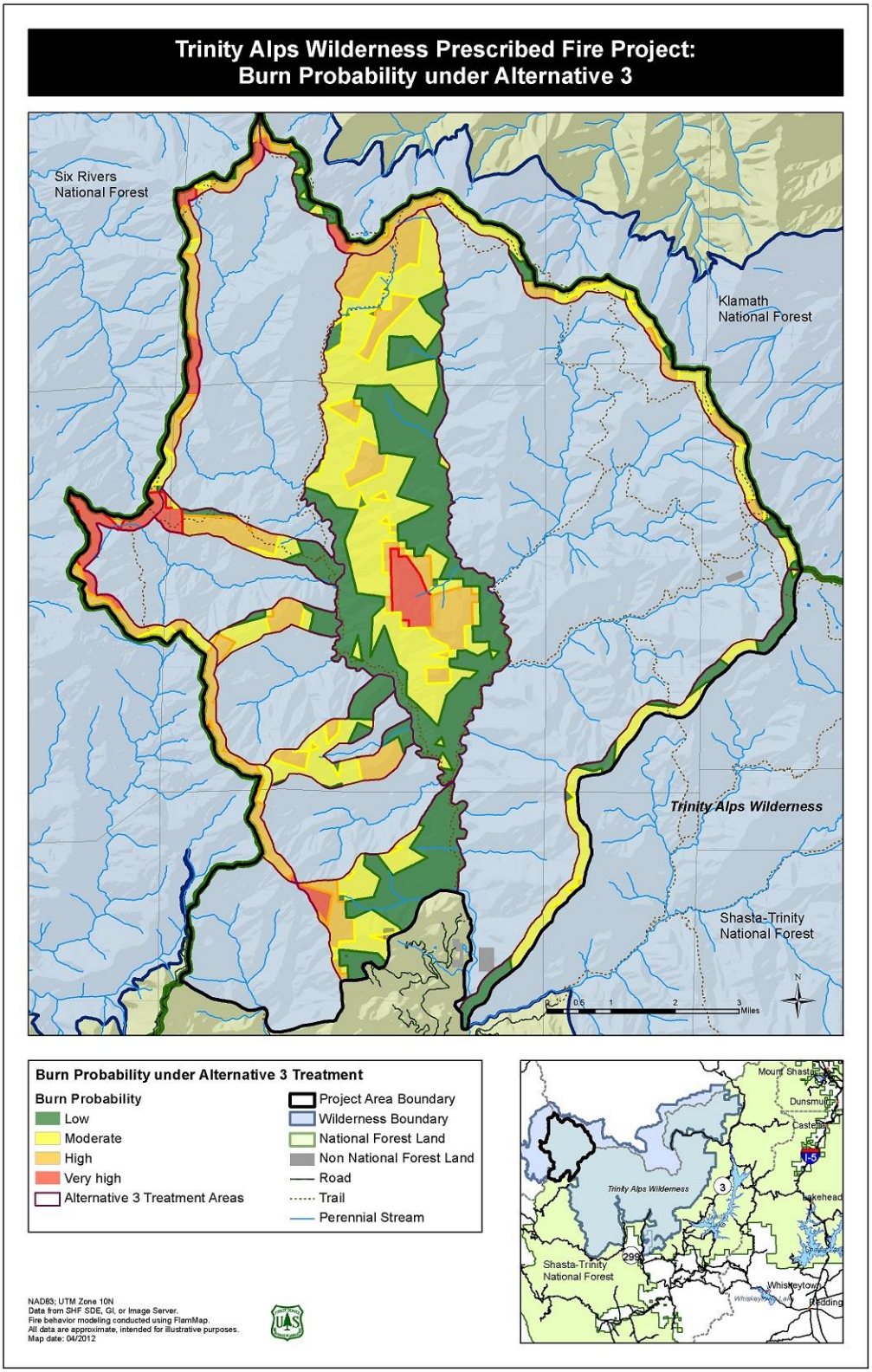


Figure F.13. Burn probabilities under Alternative 3.

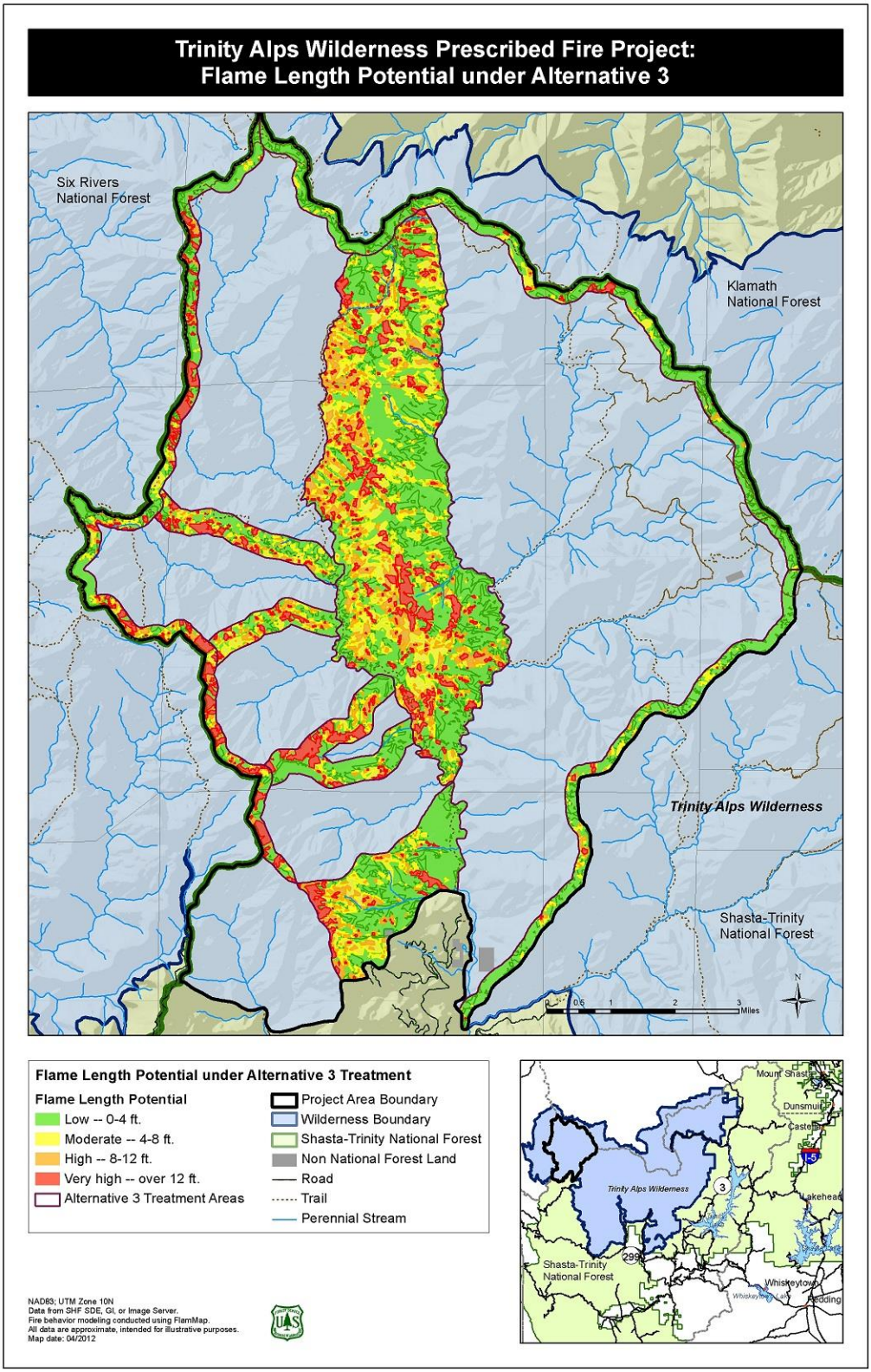


Figure F.14. Flame length potential under Alternative 3.

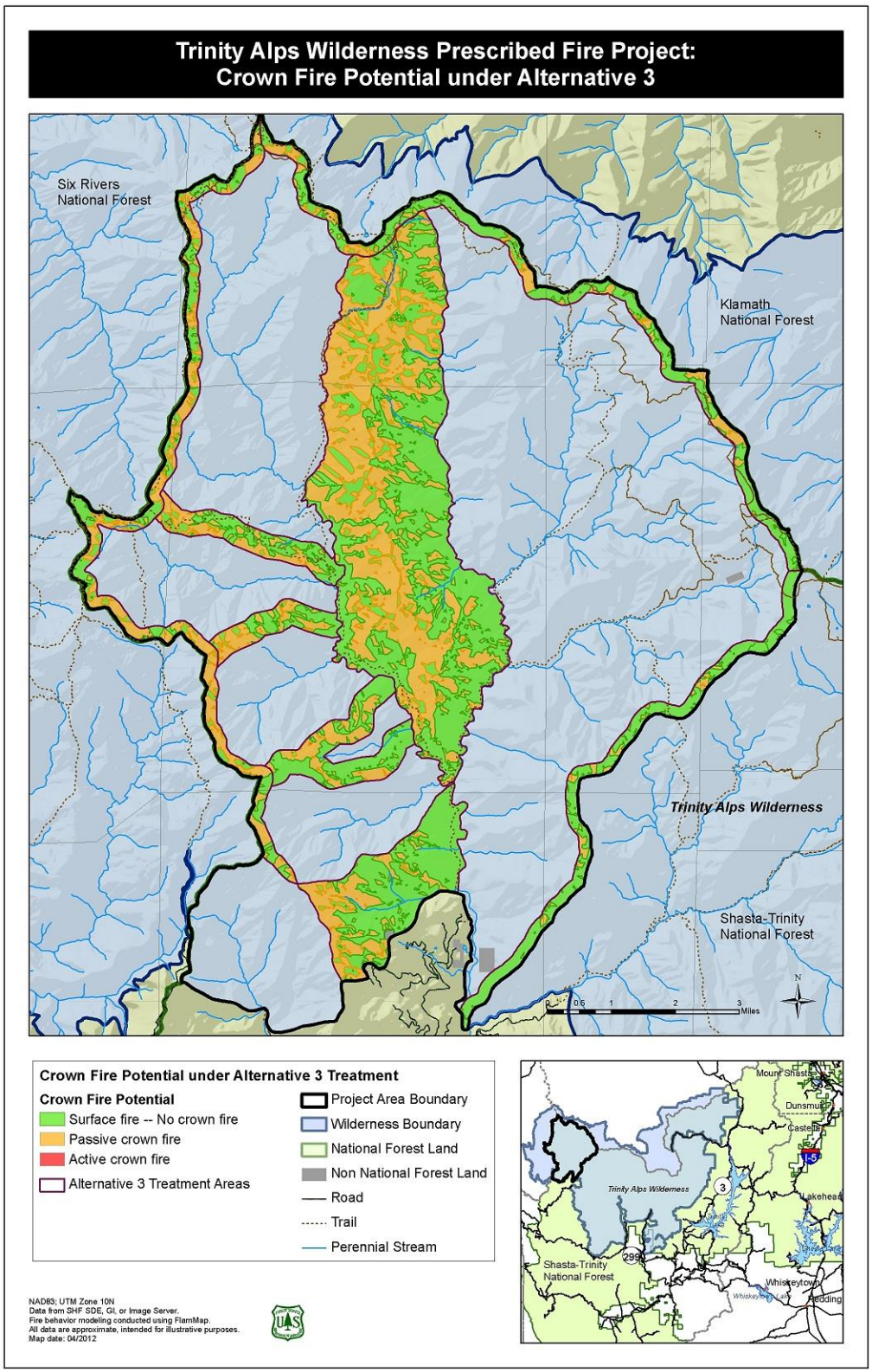


Figure F.15. Crown fire potential under Alternative 3.

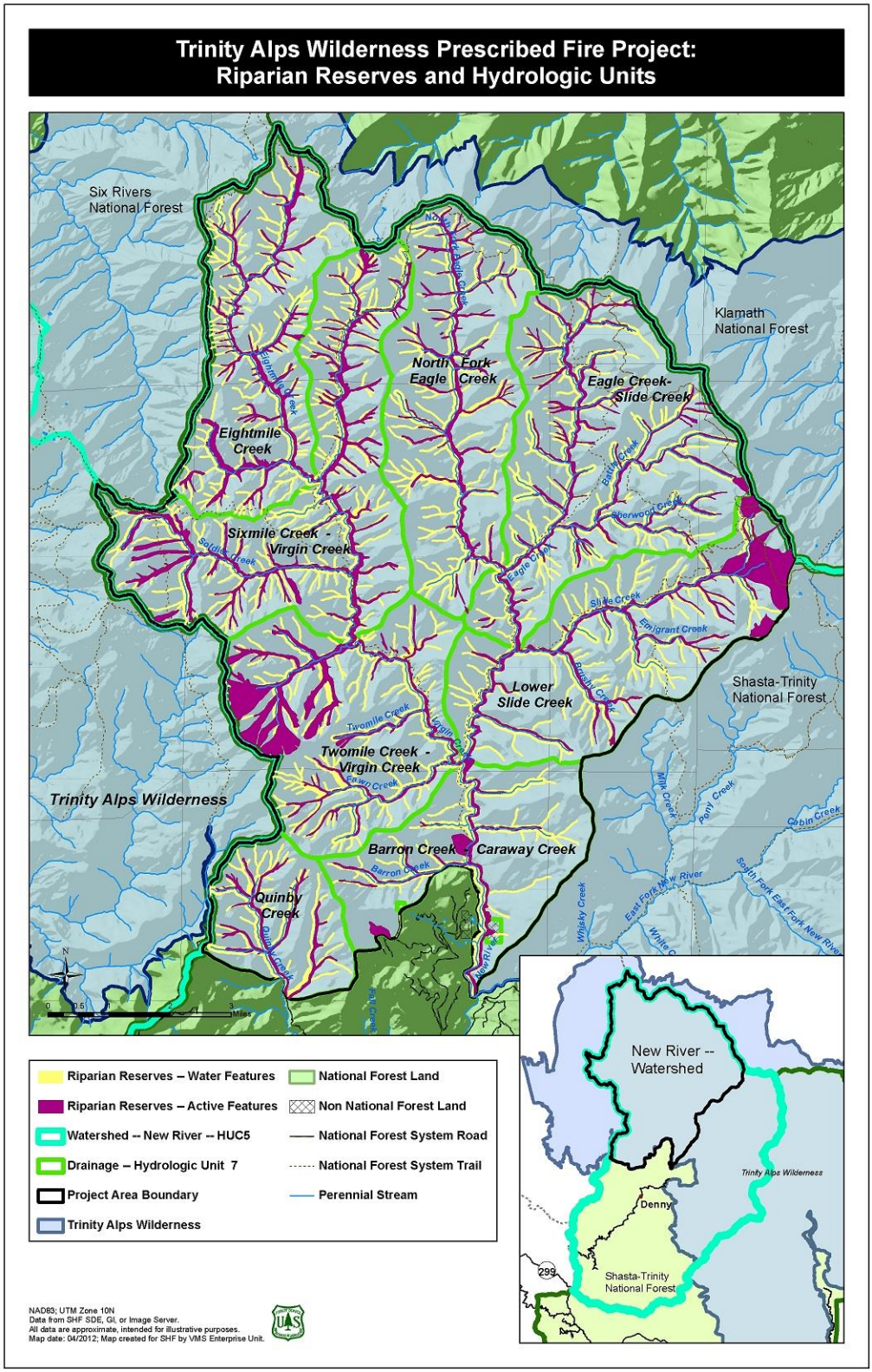


Figure F.16. Riparian Reserve and HUC Designations in the project area.

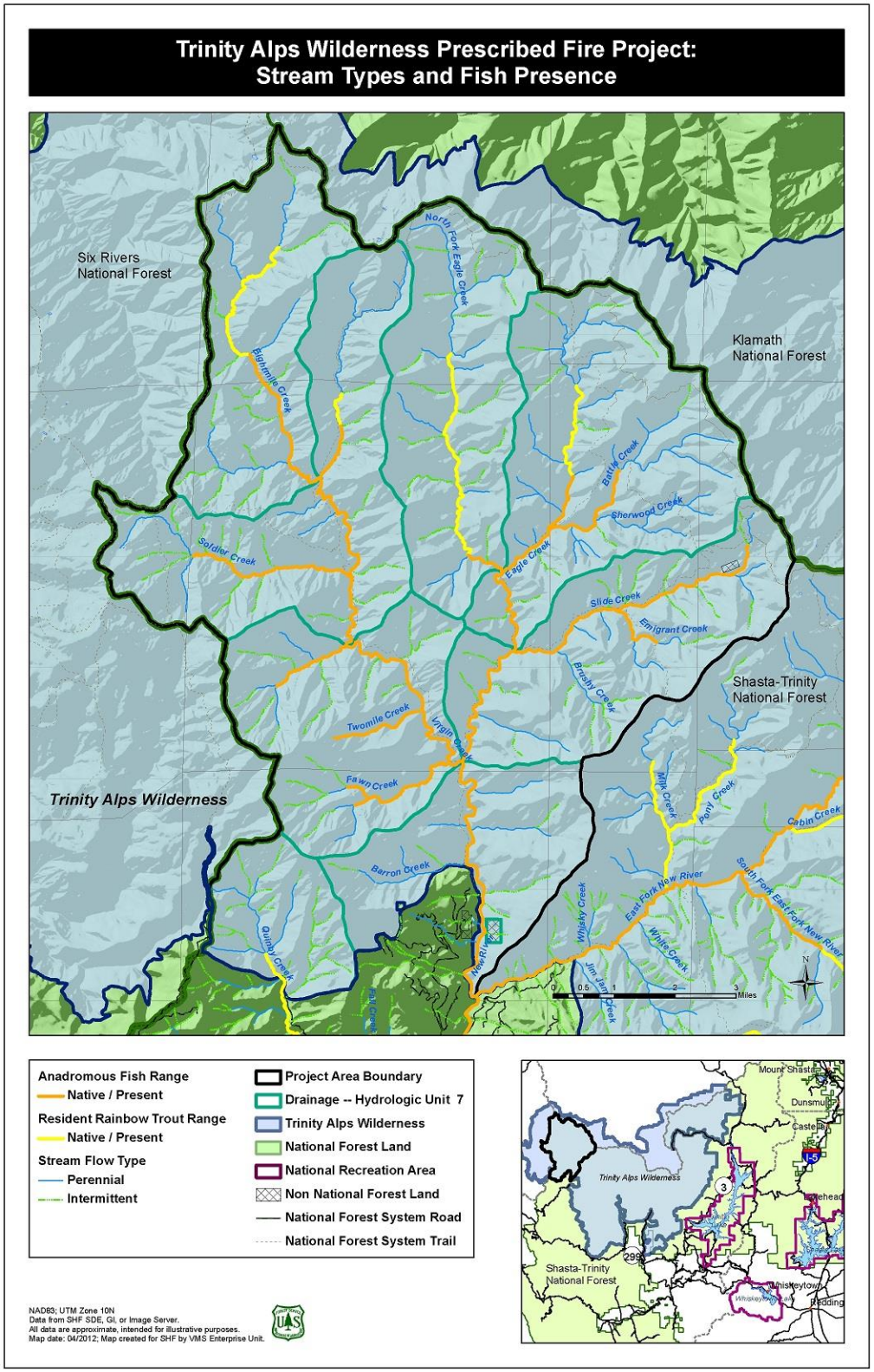


Figure F.17. Stream types and fish species range in and adjacent to the project area.

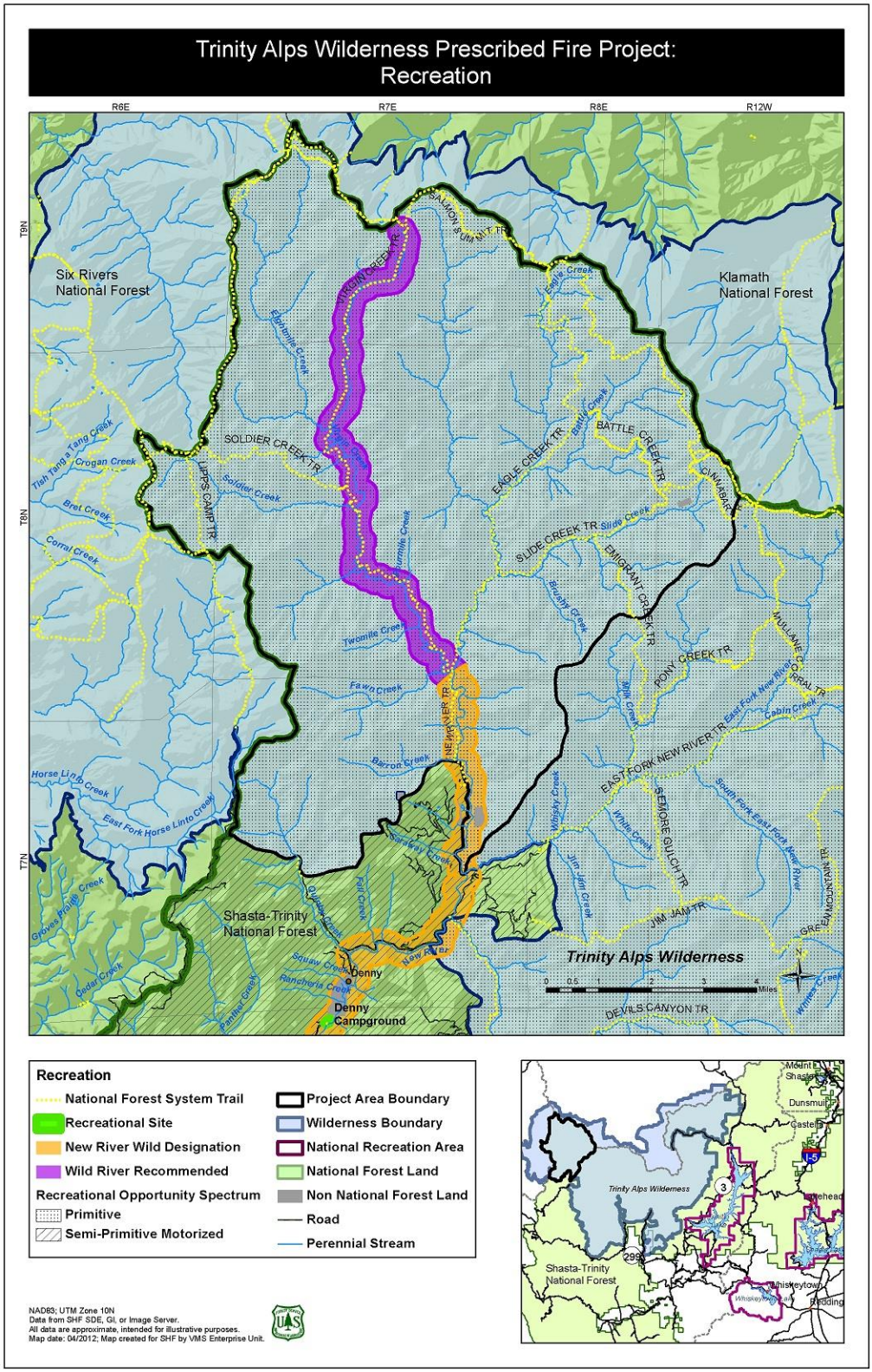


Figure F.18. Recreation within the project area.

APPENDIX G – REFERENCES

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